POPULAR SOLUTION OF THE SOLUTION OF THE MONTHLY

Here Come Cars
Without
Wheels

llso in his issue:

COMPLETE

Power Mower Conks Out

MECHANICS and HANDICRAFT SECTION PAGE 133

Here's how you may save money safely on auto insurance

Higher insurance rates may have tempted you to cut back on protection...Don't!

Allstate offers important savings, easy payments <u>plus</u> added protection



Chances are good you'll get more protection from Allstate than you have now, and savings, too. Because Allstate's rates are lower

than rates charged by most other companies. This difference in rates might enable you to buy twice the auto liability protection you have now, or add other important coverages you've been doing without. And pay for it with easy payments, too.

How come such good insurance costs less?

Allstate dared to discard horse-and-buggy selling methods. Allstate replaced them with the big-volume, low-overhead, quality-for-less business principles pioneered by Sears. Selling costs are low—so are Allstate's rates.

Savings depend on where you live and how your car is used. If you already have adequate protection, you may save \$15...\$20, or more, on an Allstate policy, compared with rates charged by most other companies. (In Texas, where all companies charge standard rates, eligible Allstate policyholders have always saved through dividends.)

Cross-country claim service

Wherever you drive in the United States or Canada, help from Allstate is as near as the nearest phone. More than 4,300 claims expediters are ready to serve you — the largest full-time, salaried claims staff in the auto insurance business. Allstate claims experts have the authority to settle claims themselves. There's no home office red tape. Claims are settled right "on the spot" in many cases.

"May we help you?"

With the cost of auto insurance going up, and today's greater need for really good protection, you owe it to yourself to get the facts about Allstate. Simply fill out the coupon, and drop it in the mail. No postage required. We'll mail your rates, together with the facts about Allstate's quality insurance. Then compare it with your present insurance, and see if you can't get more protection from Allstate—and still pay less. Mail the coupon today, or, just call an Allstate agent—see "Allstate" in your phone book. Ask about Allstate's low cost Bank Plan for auto financing.

You're in good hands with



AUTO PROPERTY LIFE*



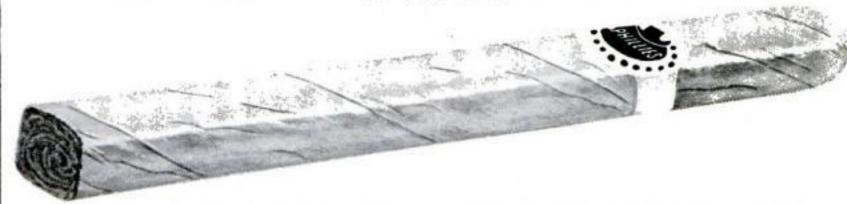
Founded by Sears, Roebuck and Company with independent assets and liabilities. Home Offices: Skokie, III.

*Written by Allstate Life Ins. Co. Now available in most states.

ROUNDUP

Hitch up your horse, pick up the boys, and head for the nearest store to git a pack of

PHILLIES CHEROOTS



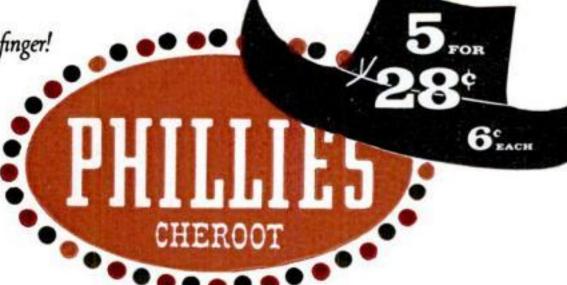
WHY HERE'S A CIGAR AS FRESH AS A NEW BORN COLT.

A spankin' new size and shape and it's

MIRACLE MILD

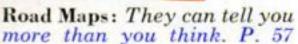
Slick on the draw and big as your trigger finger!





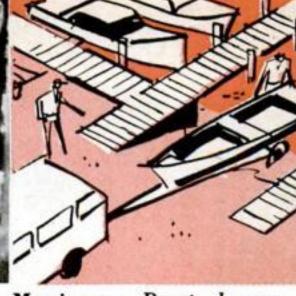
Rustle up 28 cents and buy yourself a pack of 5. If you gotta wait in line and your horse starts chompin' at the bit-tell him "whoa"-you ain't getting back in the saddle 'til you get your CHEROOTS!







Disaster! How would you react if it hit you? P. 123



Marinas: Boat boom spawns new business. P. 127

Founded in 1872 Vol. 175 No. 1

Mechanics and Handicraft REG. U. S. PAT. OFF.

Lopula	T. SCIETICE
July, 1959	SPECIAL FEATURES
Cover photo by W. W. Morris	Giant That Fooled the World 96
and Robert D. Borst	Rocket "Shovel" Digs Foxhole 108
CARS AND DRIVING	How an Exposure Meter Works112
	If Disaster Struck123

Cars Without Wheels 51	If Disaster Struck
How to Read a Road Map 57	There's Money in
Woman Driver Gives Gas Tips 68	5 Boating Tips
Preview: 1960's Full-Size Cars 76 Glove-Compartment Computer 150	SCIENCE AND IN

DISCOVERIES AND INVENTIONS

Rigger Cranks Himself Skywar	d 61
Scope Sight for a Handgun	66
Engineers' Dream-Schemes	80

PICTURE NEWS

Torture-l	Proo	f Tire .		7	
Starting	Gun	Flashes	Signal	11]
Road Ho	g Is	16 Feet	Wide	13	1

Giant That Fooled the World	96
Rocket "Shovel" Digs Foxhole	108
How an Exposure Meter Works	112
If Disaster Struck	123
There's Money in Marinas	127
5 Boating Tips	158

DUSTRY

Space Fence for Spy Satellites	62
Our Air-Crash Detectives	71
U.S. Flag Gets a New Star	
Vacuuming the Sea for Ore	102
Putting Twist in Twist Drills	

CONSUMER NEWS

New	for	Car,	Shop	and	He	me	119
The	Rop	e Yo	u Nee	d for	a	Boat.	145
Tho	se A	mazi	ng Ep	oxy A	dl	esive	s168

Editor: HOWARD ALLAWAY

Assistant Managing Editors Kendall W. Goodwyn Robert P. Stevenson Senior Editors Devon Francis, Martin Mann Everett H. Ortner Technical Editor Hubert Luckett Detroit Editor Ken Fermoyle West Coast Editor

Wesley S. Griswold

2 POPULAR SCIENCE JULY 1959

Managing Editor FRANK ROWSOME JR.

Associate Editors

Erik H. Arctander, Alden P. Armagnac Henry B. Comstock, Frank Dorr Sheldon M. Gallager, James T. Howard Herbert O. Johansen, Herbert R. Pfister Joan Steen, Ruth Westphal

Editorial Assistants

Rosa Lee Beeland (Chief) Marie A. Brew, Anna Dallas Bebe Lipson, Roberta Marks Georgette Sparks

Art Director HOWARD C. JENSEN

Art Editors

Herbert Anthony, Reginald A. Hawley Harry Samuels

Art Associates

Bertrum Green, Eric A. Karminski Jr. Henry W. Kazmirowski, Richard J. Meyer Dana B. Rasmussen

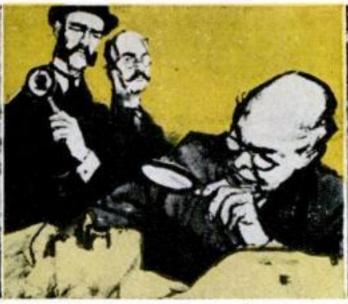
Photography

W. W. Morris (Chief) Robert D. Borst, Orlando Guerra

EDITORIAL OFFICES: 355 Lexington Ave., New York 17, N. Y.









Chipper Skipper: Pedal boat makes her a Sea Queen. P. 174

Scope Handgun: Wyatt Earp never had one. P. 66

Hoax: 90 years ago, this big phony fooled everybody. P. 96

Monthly

America's Leading New-Idea Magazine for 87 Years

AUTO UPKEEP

Hints from	the Model	Garage183
Tips for Sa	turday Mec	hanies185
Gus Meets a	Medicine 1	Man186

FOR HOME AND SHOP

Complete Tear-Out Booklet:	
If Your Power Mower Conks On	ut 83
Roundup of Carport Ideas	133
Two Mowers Better Than One	139
5 Stunts with Sparklers	149
How to Install a Skylight	152
Building a Pollen Catcher	155
Shop-Use Report on New Lathe.	160
Fix-It File: Garden Hose	163
Know-How File: Rafters	165
7 Hints for a Safer House	172
How to Build a Pedal Boat	174
Hybrid Roadster Is a C.D.C.	181

SHORT CUTS AND TIPS

Replacing Broken Fence Rails	144
Stretcher Rides on Car Seats	148
How Spigots Keep Cellar Dry	154
Jointing Plywood Panels	
Golfer Rides Converted Sulky	162
Center-Drilling Attachment	167
Doubling Kitchen Shelf Space	173
Sawhorse Toolbox	178
Clamp Pads from Clothespins	
Press for Hard-Brim Hats	

EVERY MONTH

PS Readers Talk Back	. 4
Have You Heard?	14
The Month in Science	
I'd Like to See Them Make	. 70
New Ideas from the Inventors	105
Wordless Workshop	

Publisher EUGENE S. DUFFIELD

ADVERTISING OFFICES:

NEW YORK-355 Lexington Ave. CHICAGO-360 North Michigan Ave. DETROIT-2810 Book Bldg. san Francisco-114 Sansome St. CLEVELAND-636 B. F. Keith Bldg. LOS ANGELES-711 South Vermont. PORTLAND, ORE.-520 S.W. Sixth Ave. SUBSCRIPTION SERVICE:

Address all subscriptions and correspondence concerning them to: Popular Science Subscription Department, 355 Lexington Ave., New York 17, N. Y. Allow four Advertising Manager LEE P. ADAMS

Circulation Director EUGENE WATSON

weeks' notice for change of address. Please give both old and new addresses, including zone numbers. Published monthly at 355 Lexington Ave., New York 17, N. Y., by Popular Science Publishing Co., Inc., Godfrey Hammond, Chairman of the Board; Eugene S. Duffield, President; Franklin E. Parker Jr., Secretary; Eugene Watson, Vice-President; Robert D. Beals, Treasurer and Business Manager, Secondclass postage paid at New York, N. Y., and at additional mailing offices. Entered as second class matter at the Post Office Department, Canada. Printed in U.S.A.

Copyright, 1959, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all the countries participating in the International Copyright Convention and Pan-American Copyright Convention. Single copy 35¢. Subscriptions to United States, its possessions, and Canada, 1 year \$3.40 (2 years \$6.00, 3 years \$8.00). Elsewhere, 1 year \$6.00 (2 years \$11.00, 3 years \$16.00). Send notice of undelivered copies on Form 3579 to Popular Science Monthly, 355 Lexington Avenue, New York 17, N. Y.

PS Readers



Russians Not Always First

THE picture labeled Red Special in your March issue is that of a Russian car called the Zil-III—you say. I say that it looks more like a 1955 Packard, right down to the grille emblem and the parking lights. What goes on here?

CARL WOHLTMANN, Palisade, N.J.

It looks like a '55 Packard because it is a copy of a '55 Packard.

Loves That Borgward

When Harry Walton tested the dual heaters on the Borgward, as reported in April, he must have overlooked something in the control mechanism. I can drive my Isabella station wagon in any weather without having to wear a topcoat. My only complaint on the heaters is that they work too well.

I agree with all the nice things he says about the Borgward. In 28 years of driving, I've never handled a car that can match it.

R. H. Long, Caldwell, N.J.

The Manganese Mystery

One of your letter writers in March said that India is getting set to swap manganese for surplus U. S. wheat.

I live in an area which has a large number of manganese mines shut down. These mines, especially those in the Lake Valley-Hillsboro-Kingston area, were good producers not too long ago. They could easily be reopened. As they say out here: "Ni sepa el gato"—not even the cat knows.

L. E. FAY, Hatch, N.M.

Ten Years Behind Time

I'd like to know more about the time signal, the "beep" we hear every-hour-on-the-hour over radio. I've heard that it originates at the Naval Observatory

TALK BACK

and indicates the master time for the U.S. and all our ships at sea.

How the observatory determines this time, how accurate it is and how it is sent over the networks would make an interesting article.

L. E. Wilson, Cashmere, Wash.

Ten years ago [July '49] we ran the article you want. The time signal actually originates in a quartz-crystal clock in a well at the Bureau of Standards' station WWV, outside Washington. Its time is coordinated with astronomical time from the observatory. The crystal controls an oscillator that emits coded beeps. These are transmitted on several short-wave frequencies.

Some radio stations rebroadcast the WWV signal on their own frequencies. They use only the special long beep denoting the hour and do not transmit the others in between.



The Soft-Tops: Pro and Con

I've just read Hubert Luckett's "I Say Convertibles Make Sense" [April] and I agree with him 100 percent. I am on my seventh and I have never replaced a top, even though I drive a car three or four years.

Just one complaint: Why isn't there a windshield for the back-seat passengers?

R. R. GUEST, D.S.C., Reading, Pa.

... I'm driving my third convertible, and I second everything Mr. Luckett says. He refutes the old wives' tales on extremely practical grounds. No doubt he figured that if he could get folks into a soft-top,

"HOW A 'CRAZY RUMOR' GOT ME PROMOTED!"



What I overheard one morning shook me right out of a rut!

"Company's getting ready to cut back . . . bound to be layoffs," I heard them say. "Just another crazy rumor," I told myself.

Just the same, I took quick stock of myself that night. Came up with four good reasons why the company would keep me on:

Three years' experience Getting along with foreman Turning out acceptable work Prompt and dependable

And four just-as-good reasons why they might let me go:

Making no real headway Others better qualified Still rated "semi-skilled" Needs special training

I wasn't in trouble. But I sure wasn't "in solid" like I should be. That's when I made up my mind to enroll for training with I.C.S.

I picked I.C.S. because it's the oldest and largest with 257 courses. The training is quick and thorough. It's recognized by my company and accredited by the National Home Study Council. You study in your spare time and get personalized, practical instruction-know-how you can apply next day on the job.

That was a year ago. There have been two layoffs since then. While some of the others were just hanging on or being released, I was moving up. My I.C.S. training started something. Not only did it get me promoted (with a fat pay hike), but it put me in line for real advancement.

Don't wait for a "crazy rumor" to set you straight. Take out your "job insurance" right now. Mail the coupon and get full, free details on how I.C.S. has helped thousands, how it can help you. No obligation-and you get three valuable books free! (1) How to Succeed; (2) Catalog of opportunities in the field of your choice; (3) Sample lesson (math).

For Real Job Security-Get an I. C. S. Diploma!

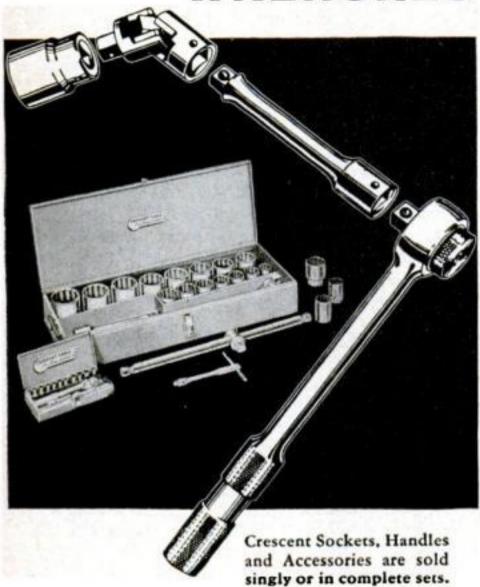
I. C. S., Scranton 15, Penna.

Accredited Member. National Home Study Council



	nd me "HOW to SUCCEED" and the			
ARCHITECTURE and BUILDING CONSTRUCTION Air Conditioning Architecture Arch. Drawing and Designing Building Contractor	AVIATION Aero-Engineering Technology Aircraft & Engine Mechanic BUSINESS Accounting Advertising Business Administration	CIVIL ENGINEERING Civil Engineering Construction Engineering Highway Engineering Professional Engineer (Civil) Reading Struc. Blueprints	☐ Industrial Supervision	Industrial Electronics Practical Radio-TV Eng'r's Practical Telephony Radio-TV Servicing RAI L ROAD Car Inspector and Air Brake
☐ Building Estimator ☐ Carpenter Builder ☐ Carpentry and Millwork ☐ Carpenter Foreman	☐ Business Management ☐ Cost Accounting ☐ Creative Salesmanship ☐ Managing a Small Business ☐ Professional Secretary	☐ Sanitary Engineer ☐ Structural Engineering ☐ Surveying and Mapping ☐ DRAFTING ☐ Aircraft Drafting	Personnel-Labor Relations Supervision MECHANICAL and SHOP	Diesel Electrician Diesel Engr. and Fireman Diesel Locomotive STEAM and
Heating Painting Contractor Plumbing Reading Arch. Blueprints	Management	Architectural Drafting Drafting & Machine Design Electrical Drafting Mechanical Drafting Sheet Metal Drafting	Diesel Engines Gas-Elec. Welding Industrial Engineering Industrial Instrumentation Industrial Metallurgy	□ Combustion Engineering □ Power Plant Engineer □ Stationary Diesel Engr. □ Stationary Fireman
Commercial Art Magazine Illus, Show Card and Sign Lettering Sketching and Painting	☐ Traffic Management CHEMICAL ☐ Analytical Chemistry ☐ Chemical Engineering ☐ Chem. Lab. Technician	Structural Drafting ELECTRICAL Electrical Engineering Elec. Engr. Technician	Industrial Safety Machine Shop Practice Mechanical Engineering Professional Engineer (Mech) Quality Control	TEXTILE Carding and Spinning Cotton Manufacture Cotton Warping and Weavin
AUTOMOTIVE Automobile Auto Body Rebuilding and Refinishing	☐ Elements of Nuclear Energy ☐ General Chemistry ☐ Natural Gas Prod. and Trans. ☐ Petroleum Prod. and Engr.	☐ Elec. Light and Power ☐ Practical Electrician ☐ Practical Lineman ☐ Professional Engineer (Elec)	Reading Shop Blueprints Refrigeration and Air Conditioning Tool Design Tool Making	☐ Loom Fixing Technician ☐ Textile Designing ☐ Textile Finishing & Dyeing ☐ Throwing
Auto Engine Tuneup Auto Technician	Professional Engineer (Chem) Pulp and Paper Making	HIGH SCHOOL ☐ High School Diploma	RADIO, TELEVISION ☐ General Electronics Tech.	☐ Warping and Weaving ☐ Worsted Manufacturing

CRESCENT FOR TOP VALUE IN SOCKET WRENCHES



Here's world-famous Crescent Quality in a moderately priced line of Socket Wrenches. All popular sizes. Fifteen set combinations: 1/4", 3/8", 1/2" and 3/4" square drives; 6, 8 and 12 point sockets; standard and deep types, and a variety of handles, drives and attachments. Precision machined from alloy steel, permitting thinner than average side walls with no sacrifice of strength. Chromeplated...loaded with utility features.

Sold by Hardware Dealers everywhere.



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

they'd just naturally learn to love being uncaged.

J. P. MALONEY, N. Bergen, N.J.

... A wagon owner may have to polish acres of roof, but he won't have to buy a new one. The top of my '57 convertible is now in need of replacement. Cost: \$150. I'd polish a lot of roofs for that.

LEE A. JOHNSON, Brockton, Mass.

... I disagree on convertibles. A new top isn't needed each year, but let's not kid ourselves about cleaning care. Mine (white) took three times as long to scrub as my hardtop (no waxing needed). It leaked when a year old; then needed top dressing, too.

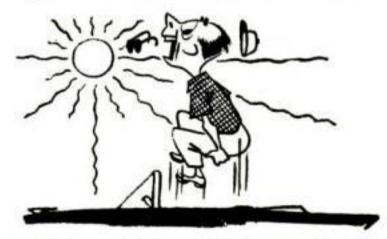
I took a beating on the trade-in. One dealer refused it, another agreed to deal at 65-percent depreciation (on a popular make, two years old) and a third let me unload at 50-percent depreciation. Any fair deal is restricted to a few short weeks in the spring.

C. Goss, Greensburg, Pa.

... May I lengthen the list of undesirable convertible features: "ballooning" by air draft; increased invitation to theft (both car and contents); and, above all, the dull appearance of the "rag" as compared to the body finish.

R. E. GIESSEMAN, Xenia, Ohio.

. . . If a convertible cost less than a whole car, it might be worth considering. And why do the characters who buy them wear caps, scarfs, even gloves? In summer have you ever tried to sit in the seat after



the car has been parked, top down, for hours in the sun? Or followed anyone on a dusty road without a roof over you?

ED DAHLIN, Brooklyn.

... This winter I drove 65 miles to pick up friends after an accident. Their convertible was smashed beyond repair but it remained upright. A highway patrolman on the scene said amazingly few soft-tops I WON'T

be a CLERK all my life

—I don't <u>HAVE</u> to!

Of course you say you won't. But you may be unless you do something about it. Hoping, wishing won't get you a better job and more money—you must prepare for that step ahead.

If you were an expert accountant right now, chances are you would find yourself in one of the best paying positions in business or industry. Surveys show that accountants earn more than many men in other major business vocations.

If you've been looking at the high incomes and good jobs enjoyed by thousands of men and women accountants today—incomes ranging from \$5,000 to \$10,000 and more per year—and envying them—why not launch such a career for yourself?

DO YOU QUESTION YOUR OWN ABILITY?

Then let us send you—without cost or obligation—this sample lesson with which LaSalle has started several hundred thousand men and women toward successful accounting careers. We want you to see for yourself how this remarkable method, originated and perfected by LaSalle, makes Accounting simple, interesting, practical and certain—how it leads you step-by-step to a complete mastery of Accounting—and on up to the coveted CPA Certificate, if you so aspire.

You don't even need previous bookkeeping experience, or to know a debit from a credit. Whether you wish to qualify as an expert accountant, auditor, controller—you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in your spare hours at home—without losing even a minute a day from your present job.

SO RIGHT NOW-TODAY

If you are earnestly ambitious for rapid advancement in a high-paying field of business—send your name and

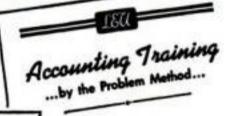
address on the coupon below. We'll send you Free our illustrated book, "Opportunities in Accounting" and sample lesson. You'll learn about today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward success as it can for you. MAIL IT TODAY!

OVER 4,500 CPAs HAVE BEEN TRAINED BY THE LASALLE PROBLEM METHOD



THIS SAMPLE LESSON HAS STARTED HUNDREDS OF THOUSANDS towards well-paid accounting careers—in business, government, and as CPAs and expert accountants. Even without previous knowledge, progress is rapid—

earning power climbs fast. This sample lesson shows you why.

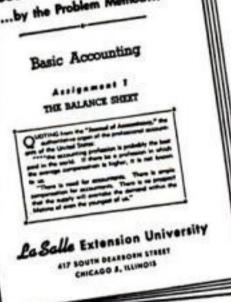


Free Sample Lesson

We offer you this sample lesson so that you can prove to yourself that you CAN master Accounting—quickly, thoroughly—in spare time at home.

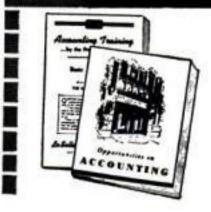
CAN master Accounting—quickly, thoroughly—in spare time at home.

You will see exactly how LaSalle's famous "Problem Method" works... how you are led step-by-step through actual accounting work—learning by doing and not by study of theory alone. First you tackle easy problems, then more difficult ones—until soon you master them all. And at every step you have the close personal guidance of LaSalle's large staff of expert accountants and CPA instructors.



Accredited by the Accrediting Commission of the National Home Study Council

SEND FOR FREE BOOK



La Salle Extension University

Dept. 783H 417 S. Dearborn St., Chicago 5, III.

Please send me, free of all cost or obligation, a sample lesson in Accounting . . . also, your latest illustrated book, "Opportunities in Accounting."

 in accidents he'd seen had rolled. My friend's next buy? Another convertible.

ED BRADFIELD, Dubuque.

... My hat is off to you. After putting up with the anti-convertible folklore put out by my pseudo-friends, I'm glad Mr. Luckett exploded the myth. Convertibles have all the virtues listed, and they make driving fun as well.

KEN GREENBERG, Chicago.

He's all wet. There's the bother of unzipping that rear window—necessary if you want it to last. It soon becomes hard to see through, you can't wipe it when it's dirty because it's easily scratched, and the zipper tears readily. Besides these, every time the top goes down, the window must come out!

Fran Greenberg, Chicago.

Midget Jeep in O.D. Dress

I was amazed to see the small jeep built by an Air Force officer ["Building One-Lung Cars for Kids," April] since I have also just completed one. I used a marine-plywood body over a steel chassis and powered it with a three-hp. Clinton gas engine. For easy operation, it has a centrifugal clutch and differential drive. Front axle is kingpin-and-spindle type and both axles are spring-mounted. Steering gear is a cut-down Crosley.

Car speed is controlled by a speed reducer and governor. Pictured with my



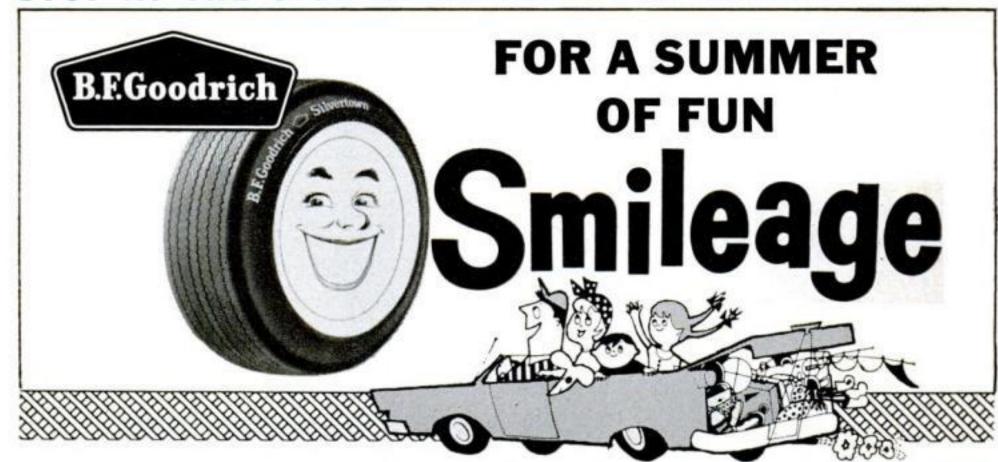
sons aboard, ready to take off in a parade, the car can be driven at 10 m.p.h.

C. W. OWEN JR., Washington, D.C.

88-Foot Highway Train

Mucн larger tandem trailers than the 60-foot South African ones ["Picture

STOP AT THE SIGN OF THE SMILING TIRE...



Summertime—and the driving is fun if you start out on B.F.Goodrich Silvertowns.

Drive worry-free on new B.F.Goodrich Silvertowns! Inventors of the tubeless tire built them, gave them tougher tests than any fast-moving vacationer could. Get Smileage now. Forget tire worries with the quality tires automakers choose for new cars year after year. 4 tires, only \$4 down.

Look for your B.F.Goodrich Smileage dealer in the Yellow Pages. The B.F.Goodrich Co., Akron, Ohio.

B.F.Goodrich Smileage dealers

8 POPULAR SCIENCE JULY 1959

A Practical New Way to End Your Job Worries!

TRAIN AT HOME FOR A SUCCESSFUL FUTURE IN AIR CONDITIONING AND REFRIGERATION



R. C. ANDERSON

If you want an interesting job that pays real well and offers year-round work—get into Air Conditioning and Refrigeration! It's a big, uncrowded field that is well-established—yet growing fast! Each year over 20,000 newly-trained mechanics are needed. No wonder! Today there are 150 million units in use—and

each year over 6 million new air conditioners, refrigerators and freezers are manufactured. All units need periodic service and repair. The pay? It ranks with the best!

Refrigeration mechanics is an easy trade to learn... Especially when you get your training through CTI. You can learn at home in spare time by practicing with commercial equipment. Get all the facts about this wonderful new way to acquire a highly-profitable technical education. Mail coupon today for fact-filled free booklets. No obligation whatever.



Easy Way to Start a Business

Own a business—and enjoy independence. Thrill to the satisfaction of being the boss. Give orders—not take them! The refrigeration field is ideal for getting started on your own. You can make friends as you make service calls. In time, you'll have a list of potential customers. You can also sign service contracts with food stores, taverns, restaurants, etc. Thousands of CTI graduates have their own successful small shops.

Get Into Auto Air Conditioning

Experts say that over 400,000 air conditioners are to be installed in autos this year. The field is growing very fast. Already auto shops are advertising for skilled air conditioning mechanics. Opportunities are excellent for starting repair shops. Some day, air conditioners will be standard equipment on cars. So get in on the ground floor now. Our catalog has information on this specialized, profitable field. It's worth looking into.



TYPICAL LETTERS FROM SUCCESSFUL STUDENTS

"I have been very busy. Had an offer to work for an appliance dealer but it looks like I'll be in business for myself before long." —Frank Fuller, Wells, N. Y...."Am now working in the field. Earn \$40 more per month than before."—Frank Krotzer, Houston, Texas... "I not only got a job, but today am foreman, earning \$60 a week more than before I enrolled."—E. E. Hughes, Chicago... "Have my own business. Only problem is: Too much business!"—Conrad King, Cynthia, Ky. You can do as well as these men!

FIRST GET THE FACTS—THEN DECIDE

Mail Coupon Today for 2 Free Booklets



You Get Experience as You Train Because You Practice with Commercial Equipment

Another CTI first! You learn by practicing—you get experience as you train—because CTI sends you 25 kits. You get all parts and tools to build a heavy-duty, commercial-type, ¼ h.p. condensing unit (illustrated above.) You build an air conditioner, freezer, refrigerator, or milk cooler. You complete 23 field-type projects—do 10 service and trouble-shooting jobs! You "boil down" years of apprentice-like training into months. Kit training perfects your skill, provides practical knowledge, assures useful experience, and helps you learn faster! CTI makes your home a training center.

Earn Extra Cash in Spare Time as You Train

Because CTI training is so practical, you'll soon be making profitable service calls. Perhaps you'll work "on your own." Or, you may prefer to get a part-time job with a local appliance dealer or air conditioning contractor. You can add to your income this way. With extra cash, you can buy additional shop equipment, pay your tuition, even bank money. Be sure to mail coupon for complete details. Act today!—Commercial Trades Institute, Chicago 26, Illinois.

COMMERCIAL TRADES INSTITUTE

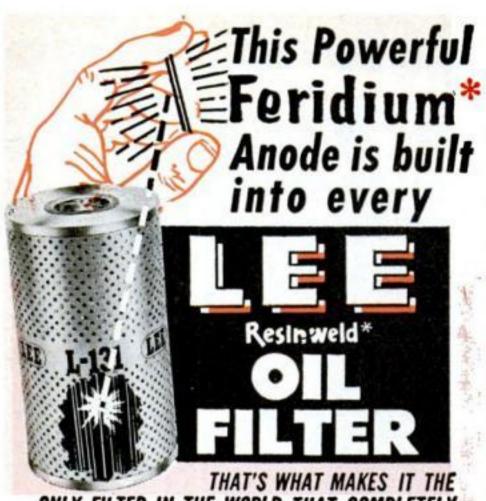
1400 GREENLEAF AVENUE CHICAGO 26, ILLINOIS Dept. R-609

Tell me how I can qualify for a better job or a business of my own. Send booklet, Success in Air Conditioning & Refrigeration, and Lesson Sample. Both FREE.

Name____Age___

Address_____



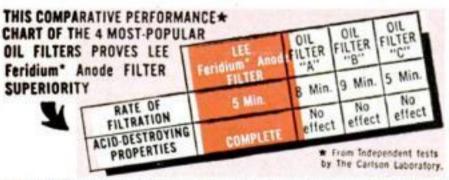


ONLY FILTER IN THE WORLD THAT COMPLETELY REMOVES BOTH ENGINE SLUDGE AND ACIDS -STOPS THE TWO MAJOR CAUSES OF ENGINE WEAR!!

Discover for yourself the amazing action of this entirely new kind of oil filter cartridge - a miniature oil refinery under the hood of your car! Discover how its DUAL ACTION not only traps injurious micron-size particles (abrasives sludge) too tiny for the eye to see - IT ALSO NEUTRALIZES AND REMOVES ENGINE-EATING ACIDS!

The patented Resin-weld* one-piece construction insures Positive Filtration from oil change to oil change. The resin-impregnated, heat-treated and cured accordion element in the plated metal shell (no paint to contaminate the oil) - the thousands of pre-determined openings all provide unrestricted oil flow.

If you demand top engine performance and value your engine life, insist on a LEE Feridium* Anode OIL FILTER. It's two filters in one — it gives you twice as much engine protection at no extra cost!!



LEE Feridium* Anode FILTERS conform to functional standards set by the Society of Automotive Engineers, U. S. Army Procurement, Fort Belvoir Research and Development and initial equipment specifications of car manufacturers. Sold all over the world at Service Stations, Garages, Accessory Stores and Car Dealers. Also available for most imported cars.

Write for free copy of the fascinating story, "Engineers Squeeze Oil Refinery Into Filter Cartridge."



News," April] are operated on the New York State Thruway by Red Star Express Lines. The tractor has a 335-hp. engine and 15 different gear ratios controlled by two shift levers.



Drivers of the 88-foot freight carrier must be certified by Thruway officials. Their records are carefully studied and they must not have had an accident in the last five years. Physical qualifications are also checked.

The registration bill for the tandem rig adds up to \$704. Thruway tolls are pegged at 10¢ a mile, double the charge for conventional trailer trucks.

EDWARD F. BREWER, Syracuse, N.Y.

They Cry Foul

Last night my young son read aloud parts of "Stupid Traffic Rules" [April] dealing with Metuchen. Very upset at what he considers unfair criticism, he made the following observations.

1. U.S. Highway 1 is not in Metuchen,

but outside the city limits.

2. The skid marks in the picture commence and continue after the stop light, not before.

3. Any good driver, seeing a stop light ahead, anticipates the possibility of its changing and reduces speed to where he can control his car without skidding.

I've taken up the cudgels in his behalf because I know that he'll be too busy "out playing" to follow through. Further, I wish to spare you the torture of deciphering his handwriting.

ELLIS DUDLEY, Metuchen, N.J.

We will cheerfully concede to the two Dudleys-considering that they have cudgels in hand-that the Metuchen picture and captions were not ideal. But we don't think that weakens Mr. Fales' point:

Thoresen's Red Hot Summer Bargains!



POWERHOUSE SLINGSHOT with Built-In RANGE FINDER!

• Kill Small Game! • Rout Pests!

Thrills galore for every sportsman! New Powerhouse Slingshot with QUADRAN-GULAR SLINGS gives more pull than ordinary slingshots. Actually 44 POUNDS of pull! Don't confuse with light duty models. This Powerhouse packs a terrific wallop! Optical cross-bar RANGE FINDER built right into handle. Sight your target—and WHAM! "A dead duck"! Also has leather pouch and brass rivets to anchor slings. Pistol grip. Ebony-tone wood. FREE with order 100 "killer" diablo Pellets. BONUS! 500 additional pellets for only \$1.

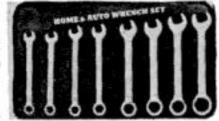
No. 928 Powerhouse Slingshot \$1.98



FREE

100 "Killer"
Diablo Pellets

8-Piece Combination WRENCH SET



Sensational value! 8-piece combination Wrench Set in handy plastic kit. Contains 8 drop-

forged chrome-plated wrenches.
One side box end, sizes 7/32"
to 7/16", other side, openend, size 1 3/64" to 3/8"—gives
you 16 wrenches! Ideal for
repairs around house or car.
No. 701 8-pc. Wrench Set \$1

MONARCH Hunting Knife





Nearly 10 inches long. Dramatic reinder scene DEEP ETCHED right into the blade. Superb workmanship you might expect in \$10.00 hunting knife. Thousands originally sold at \$2.98 and \$3.98—now price CUT to only 99c for quick SELL-OUT! Sheath included FREE! Use for hunting or den collection. No. 820.. Monarch.. 99c

MALAYAN KRIS Throwing Knife!

13 Inches Long! 2⁹⁸

World-famous Malayan Kris hunting and throwing knife. One of the most deadly weapons ever created for hunting game. Silent, accurate—it can kill a deer at 50 paces! Curving blade is sharpened all around and comes to an extremely sharp point. Will pierce metals! Heavy-duty. 13 inches long! Not for the timid. No. 929 Kris Hunting & throwing knife, \$2.98

POWERHOUSE '77' BINOCULARS Orig. \$4.98



Famous German binoculars at almost HALF PRICE! Formerly \$4.98, now \$2.69. Power lenses, smooth center focus, lightweight. 40 mm. objective lenses give sharp views—with WIDE FIELD. No. 160. Powerhouse German '77' Binoculars (no case) \$2.69 plus 27c Fed. tax. TOTAL: \$2.96.

HARA-KIRI KNIFE

lt's Weird!



Add this traditional Hara-Kirl Knife to your collection. Made in the highest standards of Samural swordsmanship! Thick high carbon steel with razor sharp edge. Use it as a hunting knife, for filleting fish, for steak, skinning, etc. A conversation piece because this is the famous ceremonial suicide knife of the Japanese warrior. Hand decorated wood handle matching wooden sheath. Price SLASHED! No. 183 Hara-Kiri Knife 1.33

THORESEN INC., Dept. 7-G, 585 Water



Made in Europe!

Powerhouse AIR RIFLE with RIFLED Barrel

Finest, most powerful air rifle we've yet seen. Made by one of the greatest firearms factories in Europe. Has genuine RIFLED barrel. Greater accuracy than ever before possible in an air air lifle. Hunt small game. Use for target practice. Stock is of hand-rubbed caucasian wood. Beautifully polished barrel. Rivals firearms costing \$29.95 for looks and precision performance.

Shipped direct to your home. Sorry, NO COD's on this item. \$9.98 plus \$1 to defray special handling & shipping. TOTAL: \$10.98, Order by No. 940.

BUYPELLETS & SAVE: No. 177, 1000 Pellets \$4.98 No. C-13 Multi-Color Darts, 72 for ... \$2.69 NOTE: Do not confuse with Boy Scout Rifles. This Powerhouse has genuine RIFLED Barrell



Plus \$1 Shipp. Total: 10.98

Street, New York 2, N. Y.

WONDER WHEEL

Figures Profits on Selling Prices & Costs, Discounts, etc., in Seconds!



125

profits IN
SECONDS
— without
pencil and
paper! IT
NEVER
makes a
mistake!
Just slide
top disc

around large disc & see answers pop into view in little windows—answers like cost-per-unit, cost-per-dozen, cost-per-3-dozen, cost-per-6-dozen, cost-per-gross. Gives most answers in one setting! Pocket size. Washable. No. 281 only \$1.25.

Fix, Mend, Repair Stops Leaks Fast!

BONDPRUF

2 tubes \$1

Stops leaks on contact. Sticks to all surfaces. Insulates & waterproofs. Used by many plumbers, handymen. Bonds metal, wood, glass, rubber, fabrics, crockery, etc. Seal hoses, boats, cans, tanks, etc. Formerly \$1 a tube. Now 2 big tubes for \$1. Order by No. 87.



MONEY-BACK GUARANTEE

THORESEN, Inc., Dept. 7-G, 585 Water Street, New York 2, N. Y.

RUSH items below. My money back if I'm not satisfied with 10-day trial.

- ☐ Check, cash or money order enclosed. Ship postage paid. (Min. Order: \$1)
- Send C.O.D., plus postage and C.O.D. fee (Enclose \$1 deposit.)

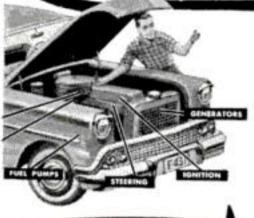
NO.	QUANTITY	ARTICLE	PRICE
			-
11 70			

PRINT

ADDRESS.

Canadian Address: THORESEN, LTD., 439 King Street West, Toronto 2B, Ont.





M oton's famous Manual makes every service, tune-up, repair a "breeze" for beginner or expert mechanic. It's like having the men who build the cars working at your side telling you exactly WHERE to look for car troubles . . . HOW to get started . . . WHAT to get started . . . tools to use . . . HOW to do practically ANY job quickly, easily, right!



- 1952 thru 1959

Buick Cadillac Chevrolet Chrysler Clipper Continental De Soto Dodge Edsel Ford Hudson Imperial

Jeep Lincoln Mercury Nash Oldsmobile Packard Plymouth Pontiac

Rambier Studebaker Thunderbird Willys

Guides You Step-by-Step

NEW, REVISED, ENLARGED Edition contains the "meat" from over 176 OFFICIAL shop manuals. 30,000 essential repair specifications on 24 different makes. 1,120 big pages. 2,850 "this-is-how" pictures. 225,000 service and repair facts. Leads beginners every step of the way. Time-saving factory repair procedures for experts. Instructions and pictures so clear you can't go wrong. Used by U.S. Army and Navy.

Same FREE Offer on MOTOR'S New Truck Manual



Brand new! Covers EVERY job on EVERY popular make gasoline and Diesel truck made since 1952. FREE 7-Day Trial.

Try Book FREE

SEND NO MONEY! Make manual show you what it's got. Unless you agree this is the greatest time and work saver you've ever seen, return book in 7 days and pay nothing. Mail coupon TODAY!

(Attach to posteard for fast action)

			_	_	
OTOR BO	OK I	DEPT.	8 8	FO: 1	

Desk 927, 250 W. 55 St., New York 19, N. Y.

Rush to me at once (check box opposite book you want):

MOTOR'S New AUTO REPAIR MANUAL. If O.K., I will remit \$2 in 7 days; \$2 monthly for 2 months and a final payment of \$1.95 (plus 45¢ delivery charges) one month after that. Otherwise I will return the book postpaid in 7 days. (Foreign price, remit \$10 cash with order.)

motor's New TRUCK REPAIR MANUAL. If O.K., I will remit \$3 in 7 days, and \$2 monthly for 3 months, plus 45c delivery charges with final payment. Otherwise I will return book postpaid in 7 days. (Foreign price, remit \$11 cash with order.)

Print Name......Age......

Check box and save 45c delivery charge by enclosing WITH coupon in envelope entire payment of \$7.95 for Auto Repair Manual (or \$9 for Truck Manual). Same return-refund

that on plenty of fast, heavily used highways, quick-changing traffic lights do contribute to chain-reaction collisions.

... Mr. Fales' article covered much that state highway departments are fighting against. But when discussing traffic signals, he does an injustice to us and his crusade.

On that signal at Bear (U.S. Route 40 and Delaware Route 7): The incredible light on Route 40 was just an out-of-order controller. If Mr. Fales had reported it to the state police, they'd have relayed the complaint to us and he'd have seen a service truck roll up with a replacement.

As for his criticism of the location of the light-tripper on Route 7: On low-traffic crossroads, a detector must be close to the intersection to cut the time short and give maximum time to the main highway. Why set it back so that three imaginary cars can follow two that actually go through?

STUART A. CUNNINGHAM State Highway Dept., Dover, Del.

Tip on Vacuum-Cleaner Forge

That forge made from a vacuum cleaner ["Short Cuts and Tips," Feb.] needs a word of warning. I know. I used an identical setup some years ago.

If you shut off the vacuum cleaner to let a coal fire die a little, gas can sneak up the line to lurk in the cleaner. Then as the innocent workshopper snaps on the



switch, a soul-disturbing explosion of curs. The opposite ends of the cleaner depart in two directions, the cleaner wall crunches into the fan which screeches to a halt-and all is silence for heavy contemplation.

The arcing of the brushes has quite an affinity for the interloping gas. In view of all this, I think it advisable to remove the cleaner hose from the pipe while it is still blowing—unless you enjoy explosions.

J. W. MAYHEAD, Waiuku, N. Z.



YOU ARE NEEDED . . . to help service, maintain and repair the mil-. lions of TV sets, radios and electronic units . . . cars, trucks and diesel engines . . . air conditioners, bousehold and commercial refrigerators, electrical appliances, etc., now in operation, plus the millions more that are being manufactured each year.

N.T.S. Trains You RIGHT, FAST and EASY! Incomplete, "Short-cut" training limits your earning power, even disqualifies you for toppay jobs. N.T.S. gives you All-Phase, complete training . . . to qualify you for any job

in your field, for greater profits all-year round.

MORE COMPLETE . . . You learn All Phases, and you receive EVERYTHING YOU NEED -Lessons, Manuals, Diagrams, many Big Professional Kits with parts, tools, instruments for your experimental, repair and service, and trouble-shooting job projects. You also receive many valuable training "Extras" to assure your success.

LOWER COST ... Other schools make several courses out of the material in each one of our MASTER COURSES ... and charge you more for less training than you get in any one of our "Big 3" at ONE LOW TUITION!



INFORMATION WILL BE MAILED ...

WORLD-WIDE TRAINING SINCE 1905

MAIL NOW TO National Technical Schools, Dept. C-79 4000 S. Figueroa St., Los Angeles 37, Calif.

Please rush FREE Book and Actual Lesson checked

(CHECK ONE ONLY)

Choose YOUR Field! Select one of the "Big 3" NOW!

GET THE BENEFIT OF OUR OVER 50 YEARS EXPERIENCE

RESIDENT TRAINING AT LOS ANGELES RESIDENT TRAINING AT LOS ANGELES
If you wish to take your training in
our Resident School at Los Angeles,
start NOW in our big, modern Shops
and Labs. Here you work with latest
equipment, professionally installed...
finest most complete facilities offered
by any school. Expert, friendly instructors. Personal attention. Graduate Advisory Service. Help in finding home
near school...and part time job while
you learn. Check box in coupon for
full information. full information.



4000 SO. FIGUEROA ST., LOS ANGELES 37, CALIF., U. S. A.

"My Future in TV-Radio-Electronics" Book "My Future in Auto-Mechanics & Diesel" Book "My Future in Air Conditioning, Refrigeration

below. No obligation. No salesman will call.

Name	WALLEY TO THE STATE OF THE STAT	Age_	
Address		58000	
City	Zone	State	

Have you heard...?

Merit-based rates for car insurance are getting a real test in Cali-

fornia. Drivers with no convictions for moving-traffic violations and no accidents for three years get a 20-percent rate reduction. If the driver has had one conviction or been involved in an accident that led to bodily injury or more than \$50 property damage, he pays the standard rate. More than one "demerit" and he pays penalty rates. Five or more and his rate doubles.

The average motorist would save between \$20 and \$50 a year, estimate the plan's co-sponsors, the National Bureau of Casualty Underwriters and the National Automobile Underwriters Association. Judging by the state's well-kept motor-vehicle records (one reason California was chosen), about half the drivers there would be eligible for the reward rate.

Statistically the scheme makes sense: Those same records reveal an extraordinary correlation between number of violations and accident-proneness. Drivers guilty of five violations have accident rates over six times the average.

Yearn for a uranium mine all your own? Dig out your flying license, dust off your wild-flower guide, and you too can compete with the experts. The latest divining methods are not strictly geological.

Prospectors in planes make slow passes at about 500 feet, trailing a cable with a sensing device called a "bird" at the end. A radio transmitter on board sends out a signal, and the bird reads the echo. Over low-ore terrain the impulses stay regular. Over ore deposits of good conductors like copper, lead, or zinc the signal jumps. One drawback: Depth range is only 200 or 300 feet—lower deposits won't be picked up. Worthless deposits may also register. Graphite is a good conductor, too.

Another airborne gimmick is a machine called the "AFMAG." It makes use of the earth's natural electricity, generated by thunderstorms and absorbed back in the earth. Good-conductor ores store more. The range here is deeper—down to 2,500 feet. Defect: There's still a chance of picking up unwanted deposits.

Picking flowers is not as batty as it sounds. Botanists-geologists have noted the abundance of certain flowers in association with minerals. The California poppy thrives near copper deposits, locoweed and uranium go hand in hand, and violets . . . why, violets are nuts about zinc!

Thinking of buying an air conditioner? Check the way it's rated before you buy. If it's measured in terms of BTU-per-hour capacity at certain temperatures and humidities set up by the National Electric Manufacturers Association or the Air Conditioning and Refrigeration Institute, you're on solid ground. If it's rated in terms of horsepower, tonnage or other test procedures, it's not up to date, and may even be meant to mislead.

A BTU (British Thermal Unit) is the standard measure of heat removal—the quantity of heat needed to raise a pound of water one degree Fahrenheit. To melt a ton of ice in 24 hours takes



"I save by mail and earn **5**% a year

It's safe . . . and so much easier . . .

I work hard for my money, so when I chose a savings account I had to know my money was safe and working hard for me. At First Western my savings earn 5% a year, and interest is paid every quarter. That means I can easily withdraw funds without losing interest, or I can let the interest remain in the account for compound earnings, every three months.

Few savings institutions can offer so much. First Western can do it because it is located in the fastest growing area in the country, where dollars are needed to finance expansion. Of course, I checked them out thoroughly and found that First Western is the largest savings and loan association in Nevada, with total resources over \$30,000,000.00. Their officers and directors are all community and state

leaders of long standing. They have always paid withdrawals instantly, and have a history of dependable performance as well as above-average earnings.

Another important point. Saving by mail is the easiest way to save, no traffic, no waiting in line, no wasted time. I find I save more, and earn more by transacting my savings business from my own home, with a First Western Savings Account."

You can open a save-by-mail account with as little as \$1.00. Accounts under \$5,000 earn 5% a year, accounts of \$5,000 or more earn 5½%. Interest is paid quarterly on all accounts. Funds received by the 15th of any month earn from the 1st.

Write or mail funds to:

FIRST WESTERN SAVINGS

AND LOAN ASSOCIATION, DEPT.T.

118 So. Fifth St., Las Vegas, Nevada • A. G. NEUMEYER, Pres.



Have you heard...?

about 12,000 BTU's an hour. So a unit having that capacity got to be called a "one-ton" unit. But in the small-room air-conditioner field, abuses crept in, and ¾-ton and one-ton units turned out to have ratings ranging from 6,000 to 11,700 BTU's-per-hour. "Horsepower" refers to the nominal rating of the motor that runs the compressor. A one-hp. motor may drive a unit in a cooling range of 8,000 to 12,000 BTU's-per-hour.

Tricky deceptions that the Better Business Bureau has warned against include "24-hour rating" (inflated by 30 percent), "maximum ratings" (they start out with higher temperature and humidity conditions and get higher output as a result), and compressor ratings alone (yielding a higher rate than when the unit is considered as a whole).

Hangover-free whiskey and instant liquor may result from current lab analyses. Chemists Laurence O'Brien and Robert Carroll, aiming to synthesize the distillates, report the following:

► Flavor, aroma and the morning-after effect derive from minute quantities (2,500 parts out of a million) of ester, fusel oil, and acetaldehyde. The rest is just alcohol and water.

▶ But change the balance slightly and you radically alter the drink.

It's what makes rye taste like rye and not bourbon.

Scotch has a smaller amount of the components than either rye or bourbon—maybe accounting for the Scotch drinkers' claim that they suffer little the next day. (But gin and vodka have still less.)

Hangover effects may depend only on fusel oil and acetaldehyde. The chemists believe these substances could be removed without affecting flavor. The

happy result? Banishment of the head-pounding genie in the bottle-and a hangover-free whiskey.

One immediate application of the scientists' work would be the use of their "flavor fractometer" to test whiskey as it's currently being made. The instrument vaporizes a sample, then separates the various components according to weight differences. Distillers could test whether anything had gone wrong with the fermentation process in its early stages.

Dog-broken house. Living in glass houses can be a shattering experience. Mr. and Mrs. Joseph James drove home one night to their plastic-and-glass house in Midland, Mich. As Mr. James pulled into the carport with their dog beside him, Ouiji's leash got tangled around Mr. James' leg. He slammed down hard on the accelerator. Next thing they knew they were in the back yard, a large hole gaping in the house behind them. But nobody was hurt, and no major house damage was done. The car had nosed out two plastic panels in the wall at the rear of the carport, dug across the living room and out the handy picture window.

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

92-G DISTRICT NATIONAL BUILDING WASHINGTON 5, D. C.

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP

BARGAIN

See the Stars, Moon, Planets Close Up! 3" ASTRONOMICAL REFLECTING TELESCOPE 60 to 160 Power—Famous Mt. Palomar Type! An Unusual Buyl



Assembled—Ready to use! You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, Star Clusters, Moons of Jupiter in detail. Galaxies! Equatorial mount with lock on both axes. Aluminized and overcoated 3" diameter high-speed f/10 mirror. Telescope comes f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 160 power. Low-cost accessory eyepiece available for higher powers. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod. Valuable STAR

CHART and 272 page "Handbook of Heavens." \$29.95 postpaid

KNOW THE TRUTH ABOUT POWER. Telescope exnomical Telescope will only give you practical powers to
about 50 or 60 times per inch of objective diameter—powers above this only produce empty magnification—make
viewing dim, difficult and unsatisfactory.

41/4" ASTRONOMICAL TELESCOPE!

270 POWER!



With this scope you can see everything as above but with greater power plus will split finer stars. Mirror has twice the light gathering power. Mirror guaranteed to give theoretical limit of resolution. Rack and pinion focusing, hardwood tri-

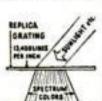
Same Telescope as above but equipped with Electric Clock Drive— Stock No. 85,094-N......\$111.50 f.o.b. Barrington, N. J.

Terrific Buy! American Made! OPAQUE PROJECTOR

Projects illustrations up to 3" x 31/2" and en-Projects illustrations up to 3" x 3½" and enlarges them to 4 ft. wide. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-andwhite. Operates on 115 volt, A.C. current. Bulb is ordinary 60-watt type, 6-ft. extension cord and plug. Size 12" x 8" x 4½" wide. Weight 1 lb., 2 oz. Plastic Carrying case with built-in handle.



Stock No. 70,199-N\$7.95 postpaid



REPLICA GRATING-Low, Low Cost

Take Unusual Color Photos at Night!

It's here—after decades of effort. Replica Grating—on film—at very low price. Breaks up white light into full spectrum colors. An exciting display. 13,400 lines per inch. Diffraction Grating has been used to answer more questions about the structure of the material world and the universe than any other single device. Use it for making spectroscopes, for experiments, as a fascinating novelty. First time available such large size—so cheaply. Comes in clear plastic protector.

Stock No. 50,202-N . . includes 2 pieces 8" x 5½".

1 transmission type, 1 reflecting type......\$ 2.00 Pstpd.

GIANT MAGNETS! TERRIFIC BARGAINS!

War Surplus-Alnico V type. Horseshoe shape. Tremendous lifting power. 5 lb. size. Dimensions:— $A-3\frac{1}{4}$ "; $B-2\frac{1}{4}$ "; $C-4\frac{3}{16}$ "; $D-1\frac{1}{4}$ "; $E-1\frac{1}{4}$ "; $F-2\frac{1}{4}$ ". Strength is about 2,000 Gauss. Will lift over 125 lbs.

Stock No. 70,183-N.....\$8.50 Postpaid 15% Ib. size. Approximately 5,000-6,000 Gauss rating. Will lift over

Stock No. 85,088-N..... Shipping wt. 22 lbs.

.\$22.50 F.O.B. Barrington, N. J.



TWO-STAGE ROCKET TOY —

Simple, safe-demonstrates principles of

jet rockets, Uses water and air as fuel.
First stage soars up 200 to 300 ft.—then
2nd stage is automatically released, going still higher. A 2nd stage
satellite is also included and may be substituted. Made of Butyrate



BARGAIN-PRICED STETHOSCOPE

FOR HOBBYISTS, SCHOOLS

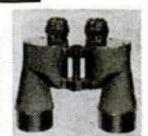
A real stethoscope at half the usual cost!

Ideal for home craftsmen, hobbyists, schools, children. Listen to running machinery, Check on hard-to-hear motor noises, leakage of gas, air or fluid. Pick up heart beats of animals, insect noises, other "unhearable" sounds. Splendid for experiments, classroom use, animal husbandry. Hours of educational fun for adults, students and children. Excellent for auto repair, do-it-yourself projects. Sensitive, yet sturdily made to stand hard use. Money-back guarantee. Stock No. 50,223-N.....\$2.95 postpaid

War Surplus American-Made 7x50 Binoculars

Big savings! Brand new! Crystal clear viewing —7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7mm. Approx. field at 1,000 yds. is 376 ft. Carrying case included. American 7 x 50's normally cost \$195. Our war surplus price saves you real money.

Stock No. 1533-N.....only \$55.00 pstpd. (Tax included)



INFRARED NAVY SNOOPERSCOPE-WAR SURPLUS!

Govt. Cost \$900-Only \$39.50

Converts infrared to visible light. See in total darkness. Use in lab, factory, classroom, etc., or dismantle for fine optical parts or power

INFRARED LIGHT SOURCE AVAILABILITY!

You will need a 6 volt transformer or 6 V auto battery to Stock No. 80,035-N.....\$10.00 Pstpd.



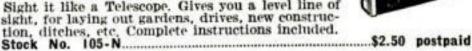
BUILD A SOLAR ENERGY FURNACE

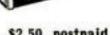
A fascinating new field. Build your own Solar Furnace for experimentation-many practical uses. Easy! Inexpensive! Use scrapwood! We furnish instructions. The sun powered furnace will generate terrific heat-2000° to 3000°. Fuses enamel to metal. Sets paper aflame in seconds. Use our Fresnel Lens—14%" diameter...f.l. 14".

Stock No. 70-130-NFresnel Lens\$6.00 Pstpd.

HAND SIGHTING LEVEL

Described in Popular Mechanics March 1959 issue, page 212 Sight it like a Telescope. Gives you a level line of





ERECT IMAGE LOW POWER MICROSCOPE 5X, 10X, 20X

\$80.00 Value - Only \$19.95

Extremely sturdy with rack and pinion focus-ing, color corrected optics, turnable microscope body for inclined viewing, three different powers. long working distance under objectives, sufficient eye relief for easy viewing. Made from war surplus optical instrument so that you actually get \$80.00 of value. Weighs 4 lbs., 13" high. 10-DAY FREE TRIAL. Accessory objectives available for powers of 15X, 30X, 40X.

Stock No. 70,172-N.....\$19.95 Postpaid

FREE CATALOG-N

100 Pages! over 1000 Bargains! Yours for the asking

America's No. 1 source of supply for experimenters, hobbyists. Complete line of Astronomical Telescope parts and assembled Telescope. Also huge selection of lenses, prisms, war surplus optical instruments, parts and accessories. Telescopes, microscopes, satellite scopes, binoculars, infrared sniperscopes, science, experiment items, etc.



REQUEST CATALOG-N

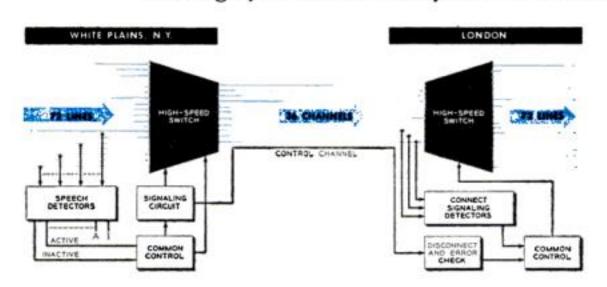
ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

BARRINGTON, NEW JERSEY

The month in science

Talk, talk all the time. The Telephone Company is pained by the awful fact that people don't talk in a steady stream, like water flowing down a river. Part of the time they stop to listen. And even when they're not listening, they talk in spurts. It turns out that a one-way telephone channel is really busy with talk only a third of the time. Two-thirds of the time the channel is free of talk and waiting for traffic, even though it seems busy and unable to take on a paying customer. That hurts.

Now comes a way to fill in the free time between one man's talkspurts (that's what the phone engineers call them) with somebody else's talkspurts. Several different conversations get sandwiched together in one channel—a great economy. The first talk-sandwiching system—technically it's Time Assignment Speech Inter-



polation, or TASI switches into the transatlantic phone cable next year. That cable cost \$40,000,000 and provides 36 channels (each way)—more than a million bucks per channel. TASI will double its capacity so that it can handle 72 conversations

at once, instead of the measly 36 that it is handling at the present time.

TASI is one of the phone company's more intelligent robots (thousands of transistors, diodes and printed-circuit boards). It watches the traffic without interfering until all 36 channels are occupied, one conversation apiece. When call 37 comes in, it starts its sandwiching act, and continues tucking talkspurts into free time in one channel or another as long as there are more conversations than channels.

To find the free time, it has speech detectors listening in on each conversation. The detector is a special amplifier that switches its output one way for a strong signal (talk), another way for a weak signal (no talk). It is so delicate it can distinguish between heavy breathing and faint speech.

When the detector finds no-talk on the line it monitors, it tells the control circuits: "Here is free time, a line that can be cut off its channel." The disconnect does not actually take place, however, unless TASI needs the free time for somebody else—unless another detector says: "Find me a channel, I've got a talkspurt with no place to go."

During busy hours, a single talker gets switched from channel to channel, a few slices of his speech on this channel, a few slices on that channel. The man listening to him at the other end has to be switched exactly the same way if he's to hear anything but gibberish. So whenever TASI switches a talkspurt into a new channel, it first sends an identification signal ahead. In effect, TASI says: "This is talker 67 coming through on channel 18."

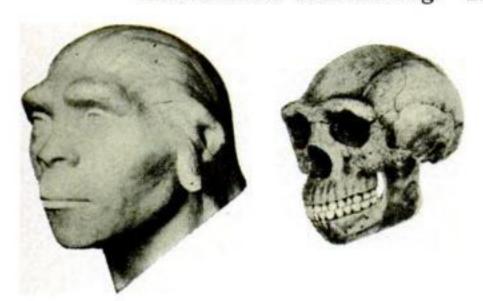
The month in science

That tells the receiving terminal to connect listener 67 to channel 18.

What happens if everybody talks at once—if there are more than 36 simultaneous talkspurts, therefore no free time? Somebody is "frozen out." TASI queues the freezeouts, so that the talker frozen out the longest gets the first free line, but his frozen-out speech is lost—clipped, the engineers say.

The law of averages comes to the rescue here. With 36 channels, freezeouts are unlikely to be frequent or long. The statisticians calculate that, on the average, less than one talkspurt in 10,000 will be frozen out for as long as ¼ second (clipping one or two syllables of speech), and this will happen only once every 30 calls during the busy hour. Listening tests showed that this much clipping wouldn't even be noticed by the average person.

Who snatched Sinanthropus Pekinensis? A real-life scientific mystery—complete with priceless treasure (some old bones), war, shipwreck, oriental intrigue and the U. S. Marines—has set off international name-calling. The Chinese claim the Japanese



kidnapped their most ancient ancestor, Peking Man, who lived 300,000 years ago and is one of the earliest known humans. And they accuse the Americans of conniving with the Japanese to keep old P.M.'s bones in Tokyo.

The cloak-and-dagger tale starts in World War II. The bones were being evacuated from Japanese-held China with a contingent of U. S. Marines. Their ship ran aground in the Yangtze

River. The Marines were captured. Peking Man vanished.

The Chinese say he was spirited to Tokyo. The Japanese say they hunted for the bones in 1942 and 1943 with no luck. The American "suspect" is Frank Whitmore, chief of the Military Geology Branch, U. S. Geological Survey, who examined some fossils at Tokyo University in 1945 and is accused of Knowing Something. Whitmore will probably have to continue protesting his innocence the rest of his life. The fossils he saw in Tokyo were much younger than the missing Peking Man and have since been returned to China. Peking Man, Whitmore thinks, is at the bottom of the Yangtze River.

Mosquito-proof back yards. An insecticide the mosquito-control experts use can make your yard off-limits for the skeeters. Prof. William R. Horsfall of the University of Illinois found that dusting lawn and shrubs with a mixture of vermiculite (the mineral-of-many-purposes that is often used for mulch) and a special light oil repels the pests—they may buzz all around nearby but won't enter the dusted area. Riverdale Chemical Co. (Chicago Heights, Ill.) puts up the mix in five-pound packages, enough for a couple of average yard treatments. One dusting lasts about a week.

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS · COPYRIGHTS · PATENTS
1425 VICTOR BUILDING, WASHINGTON 1, D. C.

Still dreaming about a good job and more pay?



WAKE UP TO YOUR OPPORTUNITIES IN

PRACTICAL NEW WAY TO TRAIN AT HOME

Don't rely on luck to make your dreams come true! Be practical and depend on training. As a skilled man, you can earn up to \$125 a week and more-enjoy security - and even open a shop. Your best bet is to become an auto mechanic. That's the big opportunity field today. Over 60



million cars and trucks are on the road, and all require maintenance. At least one-third are in the heavy-repair class. There's so much work that 50,000 mechanics are needed! It's easy to learn this trade at home. Find out how by mailing coupon below.

EARN MONEY IN SPARE TIME as you train. Many students repair cars for neighbors; others get jobs in local garages; some open shops by the time they graduate. You can learn-and-earn because CTI offers practical Shop-System training.

DIESEL MECHANICS OR BODY-FENDER REBUILDING is included at no extra cost. Only CTI offers this extra choice. Get this fully-rounded mechanic's training. Send coupon for two free books.



YOU PRACTICE WITH THIS TUNE-UP KIT

Kit includes a Compression Tester, a Vacuum Gauge and Fuel Pump Tester, an Ignition Timing Light, and a portable steel case. These professional instruments help you locate en-gine troubles, let you get useful practice. You keep this kit!

MECHANIC'S TOOLS TOO

You'll use these tools to get real experience. They'll increase your interest, stamp you as a "pro." You'll earn spare time cash with them. No extra cost for tools-you keep them.



MAIL COUPON TODAY!

MAIL TODAY FOR 2 FREE BOOKS

COMMERCIAL TRADES INSTITUTE 1400 Greenleaf Ave., Chicago 26	
Dept. A-1112	MINNESON MICHARIS
Send your new Auto Mechanics book and Sample Lesson, BOTH FREE.	Fig Money to
NameAge	
Address	
CityState	-

Piano, Guitar, Accordion...

Free book tells how to learn ANY instrument at home this quick, easy, inexpensive way.

Now YOU can learn ANY instrument - at home, in spare time—even if you don't know a single note now. You'll play real tunes right away. Amazing teach-yourself way. No boring scales or exercises. Only a few cents per day. Over one million students -including Lawrence Welk

FREE BOOK shows how simple it is to learn music this quick, modern way. Write for it today. No obligation. No salesman will call. U.S. School of Music, Studie A157, Port Washington, N. Y. (Our 61st successful year.) Tear this out as reminder.

NET MAKING



LOW COST HOME TRAINING COURSE FOR BEGINNERS & ADVANCED CRAFTSMEN

Make money. Learn skills and secrets of fine woodworking and tool use. Professionally prepared shop method training tells and shows how. Covers everything. Easy to master.

Write for Free Booklet

INTERSTATE TRAINING SERVICE DEPT. F-2, PORTLAND 12, OREGON

SIGN PAINTING

Home-Study Course-Only \$5.95 Teaches you commercial sign painting and sign building as it is being done TODAY in leading shops all over the country, Com-

in leading shops all over the country, Complete practical course for self-instruction. Shows latest methods of truck lettering, office doors, wood letters, reflecting signs, plastics, sprayed signs, gold leaf, silk screen process, upto-date alphabets, money-making business information, etc.

SATISFACTION GUARANTEED OR REFUND! Contains all the instruction of a high-priced correspondence course, Full price, only \$5.95, postpaid, Or C.O.D. plus postage. No risk—order today. Satisfaction or money back! Order 'Sign Painting Course.'

NELSON-HALL CO., 210 S. Clinton St., Dept. 2GR-1, Chicago 6, III.

LEARN MEAT CUTTIN

Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full-time jobs—HAVE A PROFITABLE MARKET OF YOUR OWN! Pay after graduation. Diploma given. Job help.
Thousands of successful graduates. Our 36th
year! Send NOW for FREE catalog. No obligation. G. I. Approved.
NATIONAL SCHOOL OF MEAT CUTTING, Dept. 51-U, Toledo 4, Ohio

STUDY TO BE A DOCTOR of Psychology or Metaphysics

Obtain a Ps.D., Ms.D., or Ph.D. Be a Teacher, Lecturer or Accredited Practitioner. Teach others how to achieve Health, Happiness and Contentment. Chartered by State. Correspondence courses only. Write for FREE book telling how.

THE NEOTARIAN FELLOWSHIP

Desk 5, Pickwick Building

Kansas City 6, Missouri

Make '5 an Hour CASH PROFIT



THE DAY YOU START! Start your own business at Home... Sharpen Household. Garden and Shop **Tools in Spare Time.**

Turn spare time into Big Cash Profits with new Belsaw Sharp-All. No experience needed to sharpen knives, scissors, shears, ice skates, mower blades, hedge trimmers, axes, chisels and circular saws . . . Learn how easily you can start your own spare time business. Amazing low cost easy-payment plan. Send Postcard for FREE BOOK. BELSAW SHARP-ALL CO. 700 Field Bldg., Kansas City 11, Mo.

Pocket Transistor Radio



Smart De-sign! Size sign! cigaret package, yet thrilling performance. Weighsonly ounces. Listen while traveling, at ball game, in home or office or school. In-

case, gold metal grille. Complete broadcast band, On-off switch one end. Uses standard penlight cells (included), Guaranteed, Complete, ready for \$5.95 immediate playing. Postpaid Only.

Detroit 7, Michigan speakercludes



New Jet Engine Burns Gasoline

Powerful continual, thrust for models. boats, cars, planes.

No moving parts. Easy to start. Runs on gas. About 6-in. long.

Complete. Only Johnson Smith Company, Dept. 790, Detroit 7, Michigan

Catalog of 2900 Novelties 10c



BE A CLAIM VESTIGATOR

INVESTIGATE ACCIDENTS!

Many earning \$750 to \$1000 a month. Thousands of insurance companies, steamship lines and Government Offices need Claim Investigators. Also big opportunities for your own spare time business. We train you at home. National Placement Service FREE of extra charge. Bill King writes: "Your course has paid off for me with large earnings. You can quote me your Adjuster Training Course is worth many times the cost."
Write TODAY for FREE book.

UNIVERSAL SCHOOLS

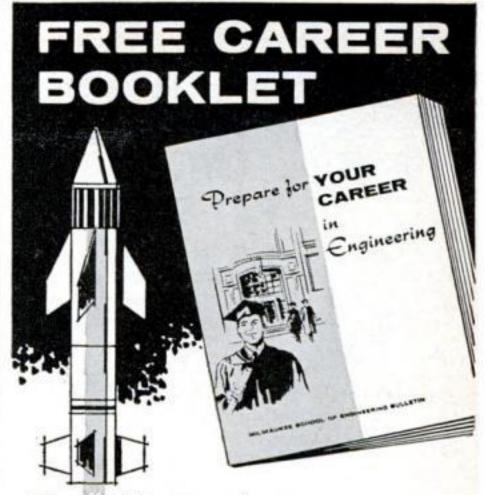
University Park, Dept. PS-7, Box 8202, Dallas 5, Texas



AT HOME! EARN LL.B. DEGREE

Legally trained men win higher positions and bigger success in busi-ness and public life, Greater opportunities now than ever before, We guide you step by step. You train in spare time. Degree of LL.B We furnish all text material, including valuable 14-volume Law Library. Low cost, easy terms. Get full details. "Law Training for Leadership" and "Evidence" books FREE, Send NOW.

Accredited Member, National Home Study Council. LASALLE EXTENSION UNIVERSITY, 417 South Dearborn Street A Correspondence Institution Dept. 783L Chicago 5, Ill.



To guide you to a successful future in

ELECTRONICS RADIO-TV COMPUTERS ELECTRICAL ENGINEERING

This interesting pictorial booklet tells you how you can prepare for a dynamic career as an Electrical Engineer or Engineering Technician in many exciting, growing fields:

MISSILES . AVIONICS . AUTOMATION SALES . DEVELOPMENT ELECTRICAL POWER . ROCKETRY RADAR . RESEARCH

Get all the facts about job opportunities, length of study, courses offered, degrees you can earn, scholarships, part-time work - as well as pictures of the Milwaukee School of Engineering's educational and recreational facilities. No obligation — it's yours free.

MILWAUKEE SCHOOL OF ENGINEERING

Dept. PS 759, 10 Please send FF I'm interested	chool of Engineering 025 N. Milwaukee St., Milwaukee, Wis. REE "Your Career" booklet in Radio-TV Computers agineering Mechanical Engineering
Name	Age
	PLEASE PRINT
Address	
	Zone State

DRAFTSMEN



LEARN AT HOME IN SPARE TIME (or at college in Chicago)

Check the want ads in any newspaper—SEE the big-pay opportunities open to you as a draftsman. What's more, you can learn this well-paid, prestige profession at home—quickly, easily! No special talent needed! Get complete, step-by-step Chicago Tech lessons in the mail, spend a few pleasant hours studying each week. In a short time you'll be a well-trained draftsman, ready to take your pick of many good jobs. Act now!



Get FREE TRIAL LESSON plus information about C.T.C. practical training. Learn what successful Chicago Tech graduates say about high pay and opportunities in drafting. No charge, or obli-

CHICAGO TECHNICAL COLLEGE

H-227 Tech Bldg., 2000 So. Michigan Ave.		
Chicago 16. Illinois Mail me FREE Lesson with tunitles in DRAFTING.	information about big oppor-	
Name		
Address		
City	Zone State	

EARN\$100 A WEEK AND UP

BE AN AUTO-DIESEL MECHANIC...EARN WHILE YOU LEARN

Many of our graduates earn \$100 a week and up. You learn fast in our school and shops because you learn with tools on real equipment. Experienced instructors explain WHY and show you HOW, then you DO IT YOURSELF. One of the best equipped technical schools in the United States. Thirtynine years' experience training men. Successful graduates in 48 states and many foreign countries. Approved for veterans. Day and evening classes. Free bulletin-write today.

NASHVILLE AUTO-DIESEL COLLEGE 226 7th Ave. N., Dept. 42 Nashville, Tenn.

MAKE EXTRA CASH

SHARPENING LAWN MOWERS THE MODERN WAY



Start your own shop! Full or spare time. Earn many dollars in a short time . . average \$5.00 per hour. Many mowers need sharp-ening. With MODERN'S Extra Heavy Duty LAWN MOWER SHARPENER AND BED KNIFE GRINDER you have 6 machines in one. All operations are done quickly and easily. You make money from the start. Write for free details.

MODERN MFG. CO. 160 N. Fair Oaks Ave. Dept. Pasadena, California



MONEY WITH RAINBOW ROCK

. . . world's most beautiful slump brick. Cuts building costs by one-third. Sell all you make to contractors, supply houses, others. Needs no special skill. Operates indoors or out from common electric socket. Protected franchise. We help you start. Write for FREE facts.

Praised by architects, builders. Makes inside, outside walls, fences, porches, fireplaces.

GENERAL ENGINES CO., INC.

Dept. SR-79

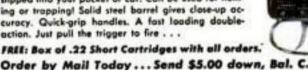
Route 130, Thorofare, N. J.

We'll Train and Establish You Start part-time if employed. You'll be trained by a nearby dealer and at 5-day training school. As carpet-upholstery cleaning expert, you provide 6 services to multiply profits and customer satisfaction. No shop needed. Just 2 average jobs a day nets \$8,750 first year. We help build your business with 27 continuous services: counseling, nat'l advertising (McCalls, Parents, House Beautiful, others), newspaper ads mats, etc. Send for FREE booklets. DURACLEAN CO., 9-187 Duraclean Bidg., DEERFIELD, ILLINOIS

LOWEST PRICED .22 Cal. REVOLVER AVAILABLE

NEW! 6 Shot .22 Short Double Action ONLY \$15. 98 -\$27.75 Value

Only Godfrey Guns could find a genuine .22 Cal. Revolver today for \$15.98. Small "Puppy" .22 Cal. REAL Revolver can be slipped into your pocket or car. Can be used for hunt-ing or trapping! Salid steel barrel gives close-up accuracy. Quick-grip handles. A fast loading double-action. Just pull the trigger to fire . . .



Order by Mail Today ... Send \$5.00 down, Bal. C.O.D.

GODFREY IMPORT CORP., Dept. PS7. 261 Broadway, N. Y. 7_

EARN WHILE YOU LEARN SEND BOOKLET

Be a LOCKSMITH

Learn fascinating, profitable trade from experts in spare time at home! Age no disadvantage. Year 'round, steady income. Full or part time. Practical, illustrated lessons. Make money even while learning! All materials and special tools supplied.

Locksmithing Institute, Dept. 207-9 150 Park Ave.. East Rutherford, N. J.

Lic. by N. J. State Board of Ed. Apprvd.for Vets

You Can Have a



Prefect Voice Institute, 210 S. Clinton St., Studio GR-1, Chicago 6, III.

only 27 months for engineering degree

Realize your dream of becoming a graduate engineer. Then promotion will not pass you by. Share rewards awaiting college men . . . higher income . . . rapid advancement. Important firms visit Tri-State campus to interview seniors. Approved for veterans. Bachelor of Science Degree in 27 months in Electrical Engineering with either Electronics or Power major . . . also in Mechanical, Civil, Chemical, Aeronautical Éngineering. In 36 months a B. S. in Business Administration (General Business, Accounting, Motor Transport Management majors). For earnest, capable students. Small classes. More professional class hours. Well-equipped, new and modernized buildings and labs. Modest costs, Year-round operation. Enter

Sept., Jan., Mar., June. Write J. F. McCarthy, Director of Admissions, for Catalog and Career Book.



579 College Avenue • Angola, Indiana



Men, women. Make big profits buying low cost imports abroad (see examples at left) and selling to friends, stores or by mail order. Famous world trader guides you-shows you how to find thousands of exotic imports for full or spare time business, how to pocket profits in advance on foreign drop shipment plan. Full details FREE! Airmail reaches us overnight. Write Today! MELLINGER CO., 1717 Westwood Dept. X-247, LOS ANGELES 24, CALIFORNIA

Famous SPEEDWRITING shorthand, 120 words per minute. No symbols: no machines: uses ABC's. Learn at home or through classroom instruction. Low cost. 500,000 graduates. For business and Civil Service. Typing available. 36th Year. Schools in over 400 cities. Write for FREE booklet.







5 DAY FREE TRIAL-EASY TERMS Buy direct from world's largest exclusive accordion dealer. Save 50% or more. Finest imported Italian makes; over 30 models, 5 Day FREE TRIAL. Life-time guarantee. Trade-ins are accepted.

Bonus gifts. Easy terms, low as \$10 monthly. Catalog, low wholesale prices—FREE—write Accordion Manufacturers & Wholesalers Outlet 2003 W. CHICAGO AVE., DEPT. P-79, CHICAGO 22, ILL.

at Home

MANY FINISH IN 2 YEARS

No classes. No time wasted going to and from school. Progress as fast as your time and abilities permit. Standard H. S. texts supplied. Thousands enroll each year in this 62-year-old school. Send for FREE descriptive booklet.

AMERICAN SCH Drexel at 58th St.,				•	
Without obligation,	please	send	FREE	descriptive	booklet.
Name		••••			

Accredited Member National Home Study Council







I Can Make YOU a New Man, Too In Only 15 Minutes a Day!

PEOPLE once laughed at my skinny 97-lb. body. I was ashamed to strip for sports. Girls made fun of me behind my back. THEN I discovered "Dynamic Tension." It made me such a complete specimen of manhood that I hold the title, "The World's Most Per-fectly Developed Man."

What's My Secret?

When you look in the mirror and see a healthy, husky, handsome, fellow smiling back at you—you'll be amazed at how fast "Dynamic Tension" GETS RESULTS. It's the easy, NAT-URAL method you can practice in your own room—JUST 15 MINUTES EACH DAY. No gadgets to fool with. You simply use the dormant muscle-power in your own body—watch it grow into solid LIVE MUSCLE. See your shoul-

World's Most Perfectly Developed Man"

with new power . . , and your whole body starts to feel "alive,"

CHARLES ATLAS

My 32-Page Illustrated Book Just Mail the Coupon

Send NOW for my famous book showing how "Dynamic Tension" can make you a new man. 32 pages. packed with photographs, valuable advice, answers many vital questions. This book is a real prize for any fellow. Yet I'll send you a copy absolutely FREE. Just glancing through it may change your life. Rush coupon to me personally: CHARLES ATLAS, Dept. 1G, 115 East 23rd St., New York 10, N. Y.



CHARLES	ATLAS,	Dept. 1G,	
		New York	

Send me—absolutely FREE—a copy of your famous book showing how "Dynamic Tension" can make me a new man, 32 pages, crammed with photos, valuable advice. This book is mine to keep, and sending for it does not obligate me in any way.

Name	(Please prin	t or write p	lainly)	Age
Address				
City		Zone	State	

EARN MORE-LEARN

	<u> </u>			
-	SEL M		THE RESIDENCE OF THE PARTY OF THE PARTY.	Ļ
AUTO DIESE BODY GAS-A Skilled a Earn tog business training easy cot Day, ev	MECHANICS L MECHANICS & FENDER REPA RC WELDING men are needed p pay in establ . Greer's exper teaches you he urses using the rening and par rement and com	REFRIG	ERATION NDITIONING IIST TRADE ED MACHINIST t of the country. r start your own and actual shop by doing—quick, and equipment. actions available. accommodations GREER'S FREE	************
JOB PL wish par DIESE REFRI	ENGINEERING ENGINEERING EL AUTOMOTIVE IGERATION & AIR ING ENGINEERIN AII Courses App ush me free li	BYICE When the time employment of DEGREE CO ENGINEERING 2 COND. ENGINE IG 18 MONTHS proved Civ. o	OURSES TO MONTHS EERING 18 MONTHS	***************************************
NAME_	16 -1 000 25 200		407	Ē
			AL SEC	
STREET.				E
STREET. TOWN_	Establ	ONE_STAT	E	
TOWN	Establ REE OX G, 2238 Chicago	ONE_STAT	OP AINING AN AVE.	,
TOWN_	Establ REE OX G, 2238 Chicago	ONE_STAT	OP AINING AN AVE.	1
Compete Logical Power of the Competer Space, to Complete Logical Power of the Competer of the	Estable REE OX G, 2238 Chicago VER Olete Lens Kit Explore the Universe Kit consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for power, 300 trom simple step Money back guarantees for the consists of the con	ONE STAT	OP AINING AN AVE.	
Compete Logical Power of the Competer Space, to Complete Logical Power of the Competer of the	Estable REE OX G, 2238 Chicago VER Olete Lens Kit Explore the Universe Kit consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for power, 300 trom simple step Money back guarantees for the consists of the con	ONE STAT	\$3.98 Moon craters, New ength ground and po 00 POWER, 150 PO 11 necessary lens fit tions, (Tripod and onn., Dept. PS	
TOWN_BC	Estable REE OX G, 2238 Chicago VER Olete Lens Kit Explore the Universe Kit consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for the consists of eyepiece lenses for power, 300 trom simple step Money back guarantees for the consists of the con	ONE STATE III SHE I 1902 IR SHOT TRANS. MICHIGATE III STATE II STATE	\$3.98 Moon craters, New ength ground and po 00 POWER, 150 PO 11 necessary lcns fit tions, (Tripod and	

679 E. Washington Boulevard, Fort Wayne 2, Indiana Please send me free information on 27 me. B.S. DEGREES in: Civil Electronics ☐ Electrical ■ Aeronautical Chemical ☐ Mechanical on 36 mo. B.E. DEGREES in: ☐ Chemical Civil Civil Aeronautical ☐ Mechanical ■ ☐ Electrical (Power or Electronics) ☐ Metallurgical on 36 me. B.S. DEGREES in:

Mathematics Chemistry Physics

WORLD'S LOWEST PRICED CALCULATOR! NEW! NEW! NEW!

TOM THUMB ADDING MACHINE

With beautiful Leatherette carrying case,
MADE IN AMERICA BY AMERICANS
Beware of chea: imported imitations.
Adds Up To One Billion—1,000,000,000
Subtracts—Multiplies—Divides
Mistake Proof-Positively 100% Accurate—
Lightning Fast-Shock Proof Solid Steel Mechanism
GUARANTEED FOR YOUR LIFETIME

GUARANTEED FOR YOUR LIFETIME

Ideal for Housewives, Shoppers, Students, Engineers and Tax work. Take it to the Super Market—Save \$8\$ every week. We pay postage if you send cheek, cash or money order—or just send your name & address and pay postman \$1.97 plus postage. Immediate Delivery—10 Day Free Trial—Satisfaction Guaranteed money refunded by return mail. Special Gift Offer: 2 Machines for only \$3.49 Agents Wanted—Make easy money selling a Top Quality Calculator at our unbelievably low price. TOM THUMB ADDING MACHINE P.O. Box 5066, Dept. X-29. Philadelphia 11. Period of the price of th

Penna. includ-ing 3 % Tax. P.O. Box 5066, Dept. X-29, Philadelphia 11, Penna.



SUPER JU JITSU

Now get tough double quick!

A course of instruction in the art of practicing and using this method of applying LIGHT.
NING-QUICK Super Ju Jitsu. Be Dangerous!
These amazing lessons show you how it's done...in a big illustrated home-study course. The weapons are just your BARE HANDS—they can be used effectively if you know how and practice the art. Easy to learn; quick. Full 76-lesson course only \$5.95 postpaid—or COD, plus postage. Satisfaction or your money back guaranteed! Order "Super Ju Jitsu Course."

Neison-Hail Co., 210 S. Clinton,
Dept. 8GR-1, Chicago 6, III.



MONEY FOR YOU...

in hidden treasures

Locate buried treasure . . . coins, gold and silver. New transistorized instruments for greater locating depth, less weight, operates on flashlight batteries. Complete line priced from \$79.50. FREE literature . . . authentic books of known treasures available. WRITE today.

GOLDAK COMPANY

1543-7 W. Glenoaks Blvd., Glendale, Calif.



IN ONE YEAR

SERVICING RADIATORS!

—Sidney Rad. Shop, Sidney, Mont.

Make good money servicing auto-truck-tractor radiators. Easy to learn. Inland, world's largest radiator equip. mfgr., offers complete package—equipment merchandising, "Pays-for-itself" Purchase Plan, free training. Small down payment on equipment starts you. Profitable dept. for

garage or service station. Write:

INLAND MFG. CO., Dept. PS-7, 1108 Jackson St., Omaha 2, Nebr.

TRUSS FREE FOR 30



lates Onl

Wear a Web-for comfortable, guaranteed relief! If not satisfied after trial, full purchase price refunded. Write today for free book on rupture care.

WEB TRUSS Co. Dept. PS-7, Hagerstown, Md.

We have taught thousands this exciting, profitable, pleasant profession. Let us teach you in your own home. Learn Finger Printing, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. Over 800 of all American Bureaus of Identification employ I.A.S. students or graduates. Write for FREE "Blue Book of Crime."

(A Correspondence School Since 1916)

INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 136B, Chicago 40, III.

Lyndhurst 5, New Jersey



MAGIC MAIL PLAN

that comes with this Little Machine CAN MAKE YOU \$5™ AN HOUR



Write today for free facts about the newest and most fascinating of all new home operated businesses. For the first time, a simplified machine brings the fabulous profits of Plastic Sealing and Plastic Laminating within reach of the small operator, Anyone can learn to operate it with a few minutes practice. Then-with our MAGIC MAIL PLAN-can get mail orders pouring in daily with cash in every envelope.

No Canvassing or Selling

Fill orders at home in spare time to start. Then expand to full time busi-ness. We even supply circulars to bring back cash and orders, Rush name for all the facts you need to start. A postcard will do. No charge.

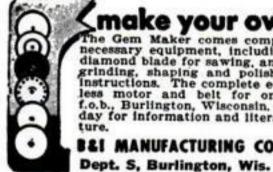
WARNER ELECTRIC CO., Dept. L-3-H 1512 Jarvis, Chicago 26, Illinois



PAYS BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOG NOW! Graduates report making substantial incomes. Start and run your own business quickly. Men, women of all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, and related subjects. STUDY AT HOME or in classrooms in leading cities. Diploma awarded. Write TODAY for free book! No obligation.

Approved for World War II and Korean Veterans

WEAVER SCHOOL OF REAL ESTATE (Est. 1936) 20205 Grand Ave. Kansas City, Mo.



The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all the wheels for grinding, shaping, and polishing; the wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt for only \$36.50, f.o.b., Burlington, Wisconsin, Write today for information and litera-

B&I MANUFACTURING CO.

WITH 100 YEAR OLD PLATING SECRETS

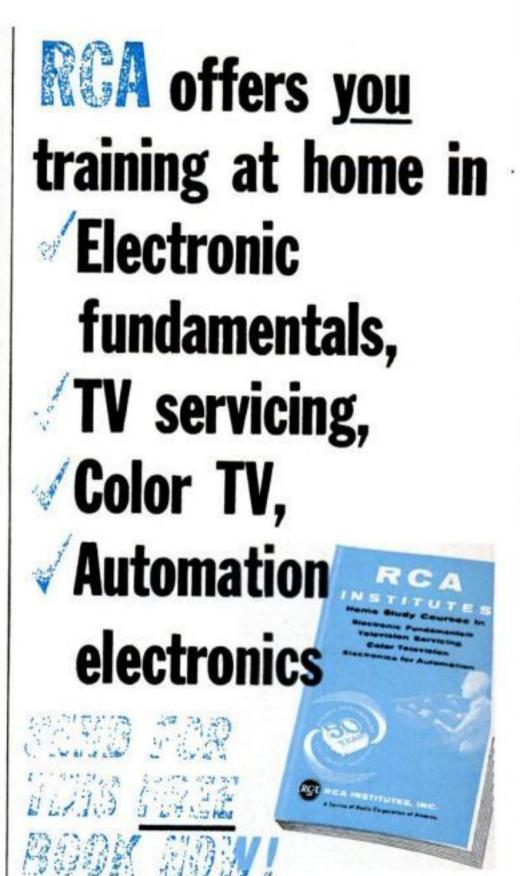
of Sheffield, Eng., developed into Kit now available to you. Nickel-plate 1000's of metal objects, accessories, jewelry items, household items for profit and fun, Lustrous and gleaming surface, ends rust, abrasion problems. It beautifies and protects. NO EXP. NECESSARY! Professional electrolysis tank plating, do plating jobs for mfrs., novelty and hobby shops, instrument makers, jewelers, etc. Kit comes complete ready to start plating, with all materials: tank, anodes, solutions, cleaners, plating frame, samples and instructions. A year's supply-enough to plate 100's of objects. Plate items (shown) at practically no material cost and charge \$6 or \$7 each.

Send \$24.95 in check or M.O. (C.O.D. \$5 deposit)

complete postpaid

MONEY BACK GUARANTEE

350 N. Foothill Rd., Beverly Hills 1, Calif.



Pay-as-you-learn. You need pay for only one study group at a time. Practical work with very first lesson. All text material and equipment is yours to keep. Courses for the beginner and advanced student.

RCA I

350 W

RCA INSTITUTES

A Service of Radio Corporation of America 350 West Fourth Street, New York 14, N.Y. In Canada -RCA Victor Company, Ltd.

FOOT C-1- 4- 1:

Joor Cole de Liesse Kd.,	montreal y, Que
nstitutes, Inc., Home Study School	PS-79
est Fourth Street, New York 14, N.	Y.

Without obligation, send me FREE 64 page CATALOG on Home Study Courses. No salesman will call.

Name Ple	ase print
Address	***************************************
City	Zone State

Resident School in New York City. Catalog on request.

Korean Vets! Enter discharge date.



save on

SEND FOR ALLIED'S BARGAIN SUPPLEMENT



BIGGEST VALUES EVER! Save most on Stereo hi-fi systems and components. See top buys in build-your-own KNIGHT-KITS. Hundreds of values in

recorders, amateur gear, P. A. systems, test instruments, TV accessories, electronic parts, tubes and tools. Send for your FREE Allied Supplement packed with bargains and new products. Save as never before!

ALLIED RADIO

ALLIED RADIO CORP., Dept. 7-G9 100 N. Western Ave., Chicago 80, III.

Send FREE Allied Supplement No. 185

-		000000	5.00	9.5117.57	1112331	
M	2012					

Address.

City.

FREE PLA tells how to start your own business

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time and make up to \$3 or \$5 an hour. You can file hand, band and cross-cut circular saws on the Foley Saw Filer. No eyestrain-no experience needed. "The

first saw I sharpened with my Foley Filer came out 1007"—writes Clarence E.

FREE SUPPLEMENT

Parsons Every saw you sharpen with the Foley Saw Filer brings you more customers. rented a two-car garage and have all the work I can do''—Charles H. Smith.



Shows How to Start

Foley Price Guide gives saw sharpening charges. Send coupon today. No salesman will call.

Send Coupon for FREE BOOK

Foley Mfg. Co., 719-9 Foley Bldg. Minneapolis 18, Minn.

Send me free book "Money Making Facts" and Foley Price Guide of saw sharpening charges.

Address.

The skilled hand of the German gunsmith is responsible for this .22 caliber, 6shot repeater automatic with self-ejecting clip. Just 4" long, fits

easily into pocket or purse. Ideal for sporting events, stage use. Excellent for training dogs. Not a lethal weapon. Money back guarantee,

(Not available to California residents.) Comes for \$6.95 ppd, from

BEST VALUES

Dept. K-522

403 Market

Newark, New Jersey

ELECTRONICS

radar, automation. Basic & advanced courses in theory & laboratory. Assoc. degree in 29 mos. B.S. obtainable. ECPD accredited. G.I. approved. Graduates with major companies. Start Sept.. Feb. Dorms, campus, H.S. graduate or equivalent. Catalog.

VALPARAISO TECHNICAL INSTITUTE VALPARAISO, INDIANA



Swiss or American

Unique Sweazey System starts you making repairs right away. Develops your skill step-by-step. Teaches simplified modern shop methods . . . professional short cuts. Learn by spare time home study from professional trade school. Low terms. Free Sample Lesson. No obligation. Write today! CHICAGO SCHOOL OF WATCHMAKING

2330 Milwaukee, Dept. 479, Chicago 47, III.

HYDRAULIC JACK Earn While You Learn at Home

Millions of jacks in gas & auto-service stations, truckers, body-shops, riggers, factories, farms need servicing. We show you HOW—easy step by step directions—what tools to use. EARN UP TO \$5 an hour, in spare time, in your own basement or garage. Start your own business NOW. Write for folder No. PS-7 & free bonus offer.

> Institute of Hydraulic Jack Repair P.O. Box 50, Bloomfield, N. J.

DRAINS cellars, cisterns, wash tubs; IRRIGATES - CIRCULATES - SPRAYS 1.001 uses. Stainless shaft. \$7.95
Won't rust or clog! Uses 1/6 \$7.95
HP motor or larger . . . 34 HP
for up to 3000 GPH; 450 GPH 80' high:
or 1800 GPH from 25' well. 1" inlet:
34"outlet. Coupling included free.
Heavy Duty Ball-Bearing 12.95
Pump. Up to 7,500 GPH. \$12.95
114" inlet; 1" outlet.
Postpaid if cash with order, Also other sizes, types.
MONEY BACK GUARANTEE.

LABAWCO PUMPS, Belle Mead 3, N.

OWEST Price SYSTEM Completely Automatici 49.95 less motor

With 1/2 HP motor, \$69.95 Bronze Gear Pump 275 GPH, 20-40 lbs. 34" fittings. Free Circular



Easy fun! 6-transistor superhet has high sensitivity & selectivity. Pushpull audio, 6" speaker for big-set sound. Send for FREE catalog on STEREO hi-fi, "ham" gear & test instruments, KITS & Factory-Wired.

EICO, 3300 N. Blvd., L. I. C. I. N. Y.

PS-7 Add 5% in West.



CONTINENTAL SCHOOLS, INC. Dept B-7. 4201 South Broadway Los Angeles 37, California

NOW IT'S TO LEARN

YOUR SPARE

HERE'S YOUR CHANCE! No matter where you live . . . no matter what your present job is, you too can soon be cashing big pay checks and enjoying an assured future in drafting! Never before has there been such a demand for trained draftsmen . . . the key men in all industry. No profession has a brighter future! Draftsmen get top pay . . are in line for promotion to executive positions.

NO EXPERIENCE NEEDED! Clevethe most modern, practical, thorough, optional. drafting courses available. They are WE HE fully illustrated; prepared especially for under C.E.I.'s guidance. Ours is a tested, proven, up-to-date course that kind offered by a Home Study School. has helped thousands of others on the road to success (many with only grammar school training).

EARN WHILE YOU LEARN! Keep your present job while learning drafting at home in your spare time at the speed that is best for YOU. Many students, as they advance, earn extra money by doing part-time drafting. Many graduates report that, as drafts-

After completing the C.E.I. course I became foreman . salary increased

Wm. Reichers

First job after taking C.E.I. course increased my salary from \$350 to \$820 per month.

G. T. Wiseman

men, pay increases quickly return to them more than the entire cost of the course.

FREE! After you graduate, 50 hours of extra training at the Institute in Cleveland Engineering Institute Courses are land. This post-graduate training is

WE HELP YOU GET THAT JOB! After you have graduated, C.E.I. will Home Study. You can learn drafting help you find a position. Our Job-under C.E.I.'s guidance. Ours is a Finding Service is the only one of its

Thanks to C.E.I. I was promoted ahead of 4 other men with a good pay increase. W. K. Andersen

The drafting job I got with C.E.I.'s assistance has given me a real start.

R. Eisenbart

WHAT CAN DRAFTING OFFER YOU? Find out how a C.E.I. DIPLO-MA can bring you a better life more security - the respect of your employer and people in your community. Without obligating yourself in any way, write for the Cleveland Engineering Institute Success Book and a Sample Lesson FREE. Industry needs men of action! This means YOU.

MAIL THE COUPON RIGHT NOW



PROFESSIONAL EQUIPMENT included at no extra cost! VETERAN APPROVED

CLEVELAND ENGINEERING INSTITUTE

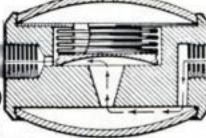


6300 Euclid Ave. CLEVELAND ENGINEERING INST., Dept. PS-7JI Cleveland 3, Ohio FREE Success Book & Sample Lesson. ☐ Architectural ☐ Aeronautical Mechanical

GUARANTEED to eliminate:

- all pulsation to carburetor
- all vapor lock
- motor spitting
- motor stalling
- motor jerking

motor flooding





SAVES GAS & CAR only \$595

GUARANTEED TO DELIVER:

- correct gas pressure and volume—always
 - gas savings
- better mileage
- maximum power
- faster starts

FR Fuel Control is not a gadget—but a scientifically proven gas regulator and saver. Guaranteed 100,000 miles. Compact sealed unit—no glass—brass bellows. Easy to install in 15 minutes. A "must" for cars, trucks, outboard motors. Only \$5.95 ppd. Money back in 30 days if not satisfied. Order today!

FR FUEL CONTROL Co., Dept. 2, Linthicum, Md.

Good Pay

STOCK CAR CHAMP:

"With FR, I get quick response and immediate pick-up."

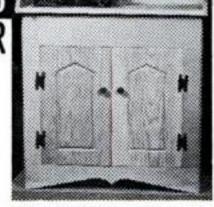


TRUCK FLEET OWNER:

"Averaging 2.1 more miles per gallon, Trucks no longer stall.



Finest workmanship, white pine, antique brass hardware. 12" deep, 30" wide and 33" tall overall, with one shelf. Sanded and ready for paint or stain. Would cost \$30.00 or more retail! OUR LOW PRICE -COMPLETE KIT with easyto-assemble instructions: \$14.75 . . . or COMPLETELY ASSEMBLED \$17.95. Express charges collect. Send check or ORDER TODAY! M. O.



SATISFACTION GUARANTEED

Free Catalog HAIRE-WOODALL SALES CO.

FORT WORTH, TEXAS P. O. BOX 9206

Jobs in For good pay, a bright future, security, get into fast-growing RADIO-TELEVISION. You can train at home. Start soon to make \$10, \$15 a week extra fixing sets in spare time. Get practical experience with equipment I send. Available to qualified veterans under G.I. Bills. Mail coupon NOW!

Will Train You at Home for

Actual Lesson and 64-page Book Mr. J. E. Smith, President, Dept. 9GB National Radio Institute, Washington 6, D.C.

BOTH

Mail me Sample Lesson and book	FREE.	HILL
Name		Age
Address		
Ci	7	C

Superior's New Model 70 UTILITY TESTER® FOR REPAIRING ALL

MOTORS · AUTOMOBILES · TV T

As an electrical trouble shooter the Model 70:



- Will test Toasters, Irons, Broilers, Heating Pads, Clocks, Fans, Vacuum Cleaners, Refrigerators, Lamps, Fluorescents, Switches, Thermostats, etc.
- Will test all TV tubes for open filaments, interelement shorts, burned out tubes, etc.
- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, Leakage, etc.
- Will measure current consumption while the appliance under test is in operation.
 - Incorporates a sensitive direct-reading resistance range which will measure all resistances commonly used in electrical appliances, motors, etc.
 - · Leakage detecting circuit will indicate continuity from zero ohms to 5 megohms (5,000,000 ohms).

As an Automotive Tester the Model 70 will test: ● Both 6 Valt and 12 Valt Storage Batteries ● Generators ● Starters ● Distributors ● Ignition Cails ● Regulators ● Relays ● Circuit Breakers Cigarette Lighters ● Stop Lights ● Condensers ● Directional Signal Systems ● All Lamps and Bulbs • Fuses • Heating Systems • Horns • Also will locate poor grounds, breaks in wiring, poor connections, etc. Model 70 comes complete including 64 page book, only...... \$1585

SHIPPED ON APPROVAL NO MONEY WITH ORDER - NO C. O. D.

Try it for 10 days before you buy. If completely satisfied then send \$3.85 and pay balance at rate of \$4.00 per month for 8 months - No Added! If not completely satisfied, return to us, no planation necessary.

	ELECTRONIC, INC.
Dept.	D-615, 3849 Tenth Ave., New York 34, N. Y.
	rush Model 70. If satisfactory, I will pay on pecified. Otherwise I will return tester.
Name.	
Address	

All prices net, F.O.B., N. Y. C

WANT MORE MONEY GET

Coast to coast, high-paying jobs in photog-raphy are waiting for people with that "knowqualify at home with the world-famous NYI Learn-by-Doing Method. Write today for free catalog. Also resident training in N. Y. 49th Year. Approved for Vets.

NEW YORK INSTITUTE OF PHOTOGRAPHY 10 West 33 St. New York 1, N. Y. Dept. 5



*Guaranteed to Contain No Clay

High income can be earned operating a Brikcrete plant, because Brikcrete - world's most modern masonry — gives more value for less cost to building owners without sacrifice of profits. Huge savings by local production makes possible low prices and high income potentials.



Choice Territories Open

Broad markets are waiting because Brikcrete is popular for every type of residential, commercial and indus-

trial construction. Ultra modern in design, size, proportion. Cost less than lumber. Wide color range. Combines all the features that make for large consumer acceptance. More local plants are needed. Exclusive privileges in franchiseprotected territories. Mark-up averages 100% on basic cost. Machine available on long-term payments. Write for Brikcrete Book No. 2 and tentative reservation of territory.

Brikcrete Associates, Inc., 422 W. 25th, Holland, Mich.

8FT. SPECIALS - 80¢



These GIANT 8 FOOTERS can be yours, while they last, at a frac-tion of their value. New, genuine neoprene govt. surplus. Great for advertising. you paint your mes-sage on 'em, inflate & fly. Attracts crowds to sales, displays, open-ings, stores, gas stations. Fun at home for young & old and just the thing for any party or school prom. Perfect for beach or picnic. They're BIG, they're FUN, they're useful so order yours today!

8' dia.-80¢ ea......2 for \$1.50 13' dia.-\$1.95 ea., 15' dia.-\$2.95 ea.

Postage pd. on ppd. orders.

Cal. res. add sales tax. Send 20¢ for latest catalog-re-

fundable on order of \$2. or more.

FRANK SALES, Dept. PS759, 3930 Sunset Blvd., Los Angeles 29, Calif.

Join our successful authors in a complete publishing program: publicity, advertising, lovely books. Send for FREE manuscript report and copy of How To Publish Your Book. COMET PRESS BOOKS

Write Dept. PA-7 200 Varick Street, New York 14

\$3.25 or 2 FOR \$6.00!

With 40 ft. of wire. Additional wire 3¢ a ft.

TESTED AND GUARANTEED

Write for free list of all types of telephones. Shipments F.O.B. Simpson, Pa.

TELEPHONE ENGINEERING CO. Dept. 7A9 Simpson, Pa.

Make\$74≌ IN ONE CALL

Take Easy Orders for Smart MASTER BOWLING SHIRTS

Cash in fast, show Style Display of Master Bowling Shirts. Slacks for men, Blouses for women to bowling leagues, forming now. Make \$74 in 1 call, even more offering custom embroidery service. No investment, no inventory. Take orders, collect profit in advance. We do all the rest. Perfect business spare time or full time, or as side-line to your present lines. Rush name for money-making Bowling Style Display, FREE!

GEO. MASTER GARMENT CO., Dept. C-40, Ligonier, Ind.



GOVERNMENT OIL LEASES LOW AS \$1 PER ACRE.

You do no drilling, pay no taxes, may realize a king-size profit without ever leaving home. Write for free map and literature.

AMERICAN OIL SCOUTS, Dept. PS Los Angeles 46, Calif. 8350 Santa Monica Blvd.

> A SPLIT-LEVEL WHAT? AN IDEA THAT'S HOT

SEE AUGUST POPULAR SCIENCE FOR ANOTHER CLUE.

Shrinks Hemorrhoids New Way Without Surgery Stops Itch — Relieves Pain

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain-without surgery.

In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all—results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne*)-discovery of a world-famous research institute.

This substance is now available in suppository or ointment form under the name Preparation H.* Ask for it at all drug countersmoney back guarantee. *Reg. U.S. Pat. Off.



Master a trade with a future-learn Auto-Diesel mechanics in our shops. You learn with tools on real equipment. Earn while you learn. Many of our graduates earn \$100 per week and up. No previous experience necessary. Day and night

Earn \$100 Per Week and up AUTO DIESEL MECHANICS

FODAY, CHOOSE YOUR

how you

years

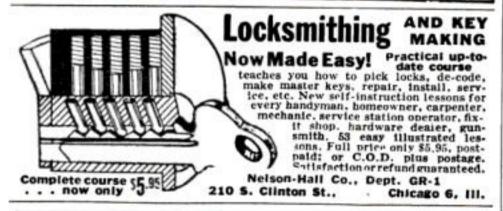
For

HI-F

courses. Approved for veterons. Write for free bulletin. NASHVILLE AUTO-DIESEL COLLEGE

226 7th Ave., N., Dept. 41

Nashville 3, Tenn



WANT A BETTER JOB? BECOME AN ELECTRONIC ENGINEER

ONLY 32 MONTHS TO EARN A BACHELOR OF SCIENCE DEGREE IN ELECTRONIC ENGINEERING

Class enrollment limited to allow for individual instruction. Chartered by State of California, Nonprofit-non-sectarian, coeducational—established 31 years. Either day or evening classes.

APPROVED FOR VETS-ENROLL NOW!

PACIFIC STATES UNIVERSITY, Dept. 79 1516 S. Western Ave., Los Angeles 6, Calif.

Please send your FREE CATALOG.

can open the door to a BETTER JOB at **BIGGER PAY for YOU**

helped many thouseriously can earn quicker promotions and bigger pay AMERICAN SCHOOL ambitious people

Without obligation, send

ADDRESS HOME Accredited Member NATIONAL HOME STUDY COUNCIL

build your own

it's easy, it's fun...

Venetia Stevenson,

High fidelity STEREO sound can be yours at savings of 50% or more. HEATHKIT step-by-step instructions, written especially for beginners, assure swift and successful assembly. Send today for the FREE catalog listing over 100 easy-tobuild HEATHKITS.



HEATH COMPANY

Benton Harbor 16, Michigan

a subsidiary of Daystrom, Inc.

Please	send	the	latest	Heathkit	Catalog.

	N	А	м	E
-	_	_	_	_

ADDRESS

CITY

ZONE STATE

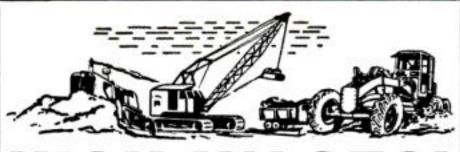
ENTORS

TATE recommend that you take the following preliminary steps toward patent protection. Make a disclosure of your invention; sign, date and have your disclosure witnessed by two people who understand your invention; authorize us to conduct a preliminary search among previously granted U. S. patents for similar types of invention. We give you a report on the probable patentability of your invention and our recommendation for further course of action.

Let us send you a copy of our instructive booklet, "Patent Protection for Inventors" and our convenient "Evidence of Invention" disclosure form. No obligation.

REGISTERED PATENT ATTORNEY

540-H MERLIN BUILDING, WASHINGTON 6, D. C.



High Wages can be yours as an Operating Engineer of heavy construction equipment! Learn NOW to operate our diesel engined bulldozers, draglines, cranes, back hoes, scrapers and motorgraders! Machines of major manufacturers are used in our training program. Contractors are on our advisory staff. Contractors need trained operators and pay high wages to our graduates.

We invite comparison and inspection of the nation's original construction equipment operator's training schools.

NEW! Announcing resident and non-resident courses in Heavy Construction Management. Write for details.

Budget plan available. VETERANS: Ask about G.I. Benefits

Write TODAY for FREE School Catalog, no obligation, to either address

THE NATIONAL SCHOOLS of HEAVY EQUIPMENT OPERATION

Dept. A-21, P.O. Box 8415, Charlotte, N.C. Dept. A-21, P.O. Box 510, Weiser, Idaho

PAINT STRAIGHT or CURVED LINES with Sensational PAINT PEN

DECORATE Furniture, Interiors, Autos, Bikes, Model Planes, Boats, Toys, Linoleums, Wall Board, etc.

PAINTS on wood, glass, plastic, ceramics, metals, fabrics and paper. Use any color paint, glue, tempera, textile paint or underglaze: secure clean, professional decorative lines. No clog or smear. Single 1/16" Stripe Model.

ORDER NOW Direct or

From Your Dealer Only \$125 Other single stripe models: 1/64" 1/32" 3/64" 5/64" 3/32" 1/8" only \$1.75 ea. Extra tips 90c each, Extra 1/4" tip \$1.20.

SPECIAL: Complete Set \$500 (Pen and all 7 tips) Only Single Line.

MFRS. ask about heavy duty, pre-cision industrial and production striping tools. FOR DEALERS:

Fast profitable seller; at-tractive display, write for money-making details. PAINTERS, CRAFTSMEN: "Professional" results every time results every time with this time-saver.

Double Stripe Model-w/5 combination \$3.25 C.O.D. Postage Collect. 4234 LINCOLN AVE. DEPT. 252 CHICAGO 18, ILL. WENDELL MFG. CO..

YOUR INVENTION BY "INVENTION RECORD" FORM AND "PATENT INFORMATION EVERY INVENTOR SHOULD HAVE".

REGISTERED PATENT ATTORNEY

WOOLWORTH BLDG., 36th FLOOR, 79C **NEW YORK CITY**



U. S. Patents protect your inventions. Our free book of "Instructions on Patent Procedure for Inventors," also "Certificate of Invention" form sent without obligation.

C. A. SNOW & CO.

REGISTERED PATENT ATTORNEYS 426 SNOW BUILDING WASHINGTON 1, D. C.

Whether an invention is patentable can be substantially determined by a search of the U.S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH

Registered Patent Attorney

805-Victor Building

Washington 1, D. C.

Send for **Book and** INVENTOR'S RECORD without obligation

GUSTAVE MILLER 79-PS Warner Building WASHINGTON 4, D.C.

REGISTERED PATENT ATTORNEY

ASSOCIATE EXAMINER U. S. PAT, OFF, 1922-1929 Patent Attorney & Advisor U. S. NAVY DEPT. 1930-1947

PATENT LAWYER

CAN BE AN AUTO REPAIR SPECIALIST in

WRITE FOR FREE COUNSELING AND INFORMATION ON COURSES

— NO CORRESPONDENCE COURSES — GUARANTEED RESULTS! 9 out of 10 A.M.I. Graduates go to work as journeymen in the trade!

AUTO MECHANICS INSTITUTE

4931 South Vermont • Los Angeles 37, Calif.

INDUSTRY APPROVED

 SUN TUNE-UP . AUTOMATIC ALINEMENT TRANSMISSIONS . BODY & FENDER • AMMCO BRAKES CLAYTON DYNANOMETER FOREIGN CARS
 ENGINES AUTO AIR CONDITIONING

Afflicted With Bladder Trouble, Pains in Back, Hips, Legs, Nervousness, Tiredness.

If you have these troubles, particularly bladder trouble, then your condition may be traced to Glandular Inflammation . . . a constitutional disease. Neglect of this condition often leads to premature old age and sometimes incurable malignancy.

The Excelsior Medical Clinic has a New Free Book that tells how thousands of men have been successfully treated here at Excelsior Springs for Glandular Inflammation by NON-SURGICAL Methods. They found soothing relief and a new outlook in the future of life.

This Free Book may prove of utmost importance in your life, Write Today. There is no obligation.

Excelsior Medical Clinic Dept. B6229 Excelsior Spgs., Mo.

SALE 20X50

High powered, whisper-weight (27 oz.!)
Color corrected, Achromatic binoculars. 7"
high! EZ to hold, EZ to
focus, Instant finger-tip adJustment, Made in Japan.

Including case
and straps!

Hard Coated thru-out!
USE 30 DAYS. If not satisfied return for refund. Add \$1 postage, handling.

Add 10% Tax UNITED BINOCULAR CO., 9043 S. Western, TRF-5616 Chicago 20, DEALERS WANTED



Would You \$1,000 A MONTH ?



That's what Stanley Hyman made selling the amazing new Presto Fire Extinguisher!
Many others "cleaning up"—so can you!
Amazing tiny new extinguisher ends fires
fast as 2 seconds. Guaranteed for 20
years! Sells for only \$4.95. Write for Free sales kit.

Merlite Industries, Inc., Presto Div., 114 E. 32nd St., Dept. P-16B, New York 16, N. Y.

UPHOLSTERY LEARN

EARN MORE MONEY

YOU'RE IN BUSINESS RIGHT OFF Practical course, complete upholsterer's tools, materials, frames, all you need to earn while you learn AT HOME. N. Y. State-approved training in upholstery, slip covers, etc. Big Opportunity Field. FREE Illust. Catalog, FREE Sample Lesson. Write Today. Approved for Vets, Accredited by N.H.S.C.

4-INCH BLADE

Upholstery Trades School, Dept. HL-1612, 721 Broadway, New York 3, N.Y.

We give you handlest hunting and fishing knife you've ever had! Has 4-INCH LONG highly tempered steel blade—VERY SHARP! Attractive handle. We send knife FREE to acquaint you with our below-wholesale bargains. Please send 25c for handling. NO LIMIT—but send 25c handling for each knife. Order TODAY! HUNTING KNIFE, Dept. K-414, Box 881, St. Louis, Mo.

Don't Neglect Slipping FALSE TEETH

Do false teeth drop, slip or wobble when you talk, eat, laugh or sneeze? Don't be annoyed and embarrassed by such handicaps. FASTEETH, an alkaline (non-acid) powder to sprinkle on your plates, keeps false teeth more firmly set. Gives confident feeling of security and added comfort. No gummy, gooey pasty taste or feeling. Get FASTEETH today at drug counters everywhere.

A CHANCE OF A LIFETIME

NOW...

Train at home for some of today's most spectacular

OPPORTUNITIES

. . . including GUIDED MISSILE CONTROL

Nothing else like it! Prepare in spare time for REAL EARNINGS in

TELEVISION RADIO •

Electronics

. the amazing multi-billion dollar opportunity field that's helping pave the way to the exploration of OUTER SPACE: Wonderful choice of opportunities for earning REAL MONEY including Radar, Television, Radio, Automation Electronics, Guided Missile Control, your own business and other interestpacked branches. NOW . . . get every modern training aid you need at home, including picture-clear MOVIES, texts, and 16 shipments of HOME LABORATORY EQUIPMENT for needed practical experience.

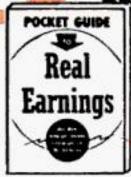


Employment Service

At no extra cost, all graduates get DeVry Tech's **EMPLOYMENT SERVICE** that has helped thousands of men earn REAL MONEY! Often more jobs than grads!

MILITARY SERVICE?

Act now. Get valuable information we have for men facing military service.



JUST "COMMON SENSE" NEEDED TO START

No advanced education or previous technical experience needed. If preferred, you may attend DeVry Tech's well-equipped laboratories in Chicago or Toronto. See for yourself. Mail coupon today.



2 FREE booklets, "Come With Us to Outer Space" **Guide to Real** Earnings." Informative! Fascinating

MAIL TODAY!

TECH

Formerly DeFOREST'S TRAINING, INC. Chicago 41, Ill. DeVRY TECHNICAL INSTITUTE 4141 Belmont Avenue,

Chicago 41, III., Dept. PS-7-P

I would like your FREE booklets and information on how I can prepare to enter ELECTRONICS.

Name					
Maile		Age			

Street City. State Zone_

Canadian residents address: DeVry Tech of Canada, Ltd., 626 Basslaun Aye.. Tarenta 12. Ontaria

EXAMINE FREE!

VOLUMES

JUST OFF THE PRESS! NOW, AT LAST-AN AUTHENTIC GUIDE TO HOME IMPROVEMENT AND REPAIR!

FAMOUS AUDELS, the world's greatest publisher of mechanical books since 1879, has now utilized all its knowledge . . . all its great fund of inside trade information . . to produce the greatest, most complete, easiest-to-use DO-IT-YOURSELF ENCY-CLOPEDIA ever offered for American family use.

SAVE HUNDREDS OF **DOLLARS EVERY YEAR!**

With this remarkable, easy-to-use, set you can save a small fortune every year for home improvements and repairs.

- Over 1,000 Pages
 Step-By-Step Plans
 Set Weights 4 Pounds
 Thousands of Photos
 Each Volume 6 ± 9 ± 2 Helpful Charts
- DO-IT-

ALPHABETIZED

Man &

EVERYTHING YOU NEED TO KNOW

INSIDE THE HOUSE . . . OUTSIDE THE HOUSE . . . AROUND THE HOUSE

Air conditioning Asphalt tiles Attics Basements Book rack Built-ins Cellings Cement Concrete

Doors Electric wiring ireplaces Flagstone tiles Floor repairs Furniture finishing Glazing winds High Fidelity

A Partial List of Contents: Kitchen layouts Lawn grass guide Lighting fixtures Locks Lumber Marble tile Masonry Miter joint

Painting Pickled pine finish Pipes Plumbing Plywood Polishing Pools Radiator covers

Room dividers Screens Spray painting Stain finishes Stairs Upholstering Varnish finish Wallpapering Wood floors

THOUSANDS OF OTHER IMPORTANT SUBJECTS

THEO, AUDEL & CO. - Self Improve nent Publishers Since 1879 49 W. 23rd Street, New York 10, N.Y.

Please mail me for 7 days FREE EXAMINATION my set of AUDELS :
DO-IT-YOURSELF ENCYCLOPEDIA. If I decide to keep the set I will send you \$3 in
7 days and then \$3 a month until I have paid the full purchase price of \$8.95 plus
shipping costs. Otherwise I will return the set to you and owe nothing.

ADDRESS

EMPLOYED BY.

SAVE SHIPPING COSTS! Check here if you enclose complete per ment with order. We pay postage charges. You have same return privilege.

FREE BOOK

THE LAW! TRAINED MAN

Write today for a FREE copy of illustrated law book, "THE LAW-TRAINED MAN," which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost; convenient monthly terms. Write for FREE law training book today.

Blackstone School of Law, 307 N. Michigan Ave. Dept. 12B, Chicago 1, Illinois Pounded 1890

CURE THAT GAS EATER...

with triple-action

MILESMASTI

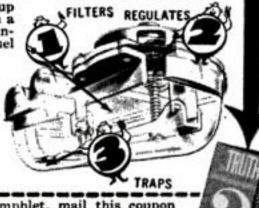
Mail Coupon for free pamphlet: "THE TRUTH about FUEL PRESSURE REGULATORS'

Authoritative engineering answers explain why over a MIL-LION installed in cars and fleets to save 15 ways including:

Save up to 20% on Gas • Stop Stalling, Vapor Lock, Flooding Stop Rough Idling • Stop Hard Starts, Jerky Acceleration Improve Filtration, Stop Fuel Clog • Reduce Carburetor Wear

Insist on Milesmaster-get up to 36 to 40 EXTRA miles in a tankful of gas! It's the "3-in-1" quality Leadership Fuel Pressure Regulator.





For free "TRUTH" Pamphlet, mail this coupon with your name and address in margin. No obliga-tion. Sold only at retail through 40,000 auto service outlets on Money Back Guarantee.

Milesmaster, Inc., Dept. 106, 1550 E. 74th Pl., Chicago 19, Ill.

FUN & PROFITABLE HOME BUSINESS

Flok-Fraft is the craziest stuff. With this amazing new velvet fiber spray you can turn lamps, radios, cabinets, figurines and 1000 other items into velvety objects of art. You can turn your spare time into real fun and big profits!

EARN UP TO \$300.00 PER WEEK SPARE TIME!

You can be crazy like a fox. In 15 minutes time, with 34¢ worth of Flok-Kraft, you can give an ordinary object a gorgeous 3.D finish and charge at least \$10.00!

REPRESENTATIVES IN YOUR AREA URGENTLY NEEDED

Own your own business. Work at home in your spare time. Help fill the huge growing demand for this unusual velvetfiber finish. Orders come from stores, offices, homes, decorators, auto dealers - everywhere. Possible million dollar boom. Get your share. Investigate today - be first in your area! Actual samples in 24 radiant colors. Confidential booklet: "101 Money-Making Ideas" sent [ree! Send no money. Coast Industries, Los Angeles 61, Calif., Dept. A-7



Train on full Size equipment at Coyne-Largest best equipped school of its kind. Est, 1899, Employment Service to graduates, Liberal Payment and Credit Terms, Part Time Employment help for students. Get full details, Send card or letter today for 48-page illustrated FREE Book, "Guide to Careers." No obligation, No salesman will call, Coyne Electrical School—1501 W. Congress Pkwy.—Dept. B9-4A—Chicago 7, Ill.

PHOTOGRAPHIC BARGAIN CATALOG Thousands of money saving

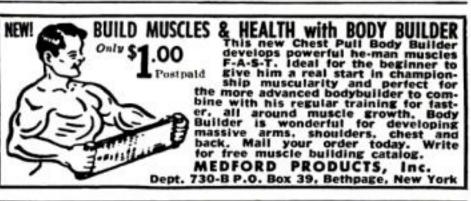
hotographic bargains. Illustrated and carried in stock by Central Camera Company the largest photographic store and largest photographic mail order supplier in the middle west. Send 25c for your copy. Credit will be given on first order for \$3.00 or more.

PHOTOGRAPHIC HEADQUARTERS SINCE 1899

CENTRAL CAMERA COMPANY

230 SO. WABASH AVE - CHICAGO 4. ILI Dept. VS-7

SAVINGS! SEND 25¢ FOR COPY, CREDIT FIRST ORDER CENTRAL CAMERA CATALOG





NOW! ESH ANALYZE HANDWRITIN "read-between-the-lines

Now you can "read-between-the-lines" of personal letters, notes, signatures, etc. Understand hidden meanings . . . see true characters would stand hidden meanings . . . see true characters of the writers. Amazing new text by world-famed M. N. Bunker, founder, International Grapho Analysis Society. Thoroughly illustrated step-by-step instructions bring you a sure way to REALLY know people.

FULL PRICE ONLY \$595

COMPLETE SATISFACTION GUARANTEED! Helps you better understand yourself, your family, friends, neighbors, business contacts. Complete price only \$5.95 postpaid—or C O D plus postage. Satisfaction guaranteed or your money back instantly. Order "Handwriting Analysis" today from Nelson-Hall Co., 210 S. Clinton St., Dept. 3FR-1, Chicago 6, III.



One of our BEST Values! 2.9 AMP HEAVY DUTY 1/4" RAM DRILL

with Jacobs Geared Chuck & Key

Ask any expert and he'll Reg. \$39.95—Our Price \$14.95 always say "RAM for plus 50c pp. & hdig. \$14.95 Heavy Duty Work." Not just an ordinary 2, 2½ or 2½ amp unit, but a powerful full 2.9 AMP, drill to do every heavy duty job in home, shop or industry. Built to take years of rough-tough use. Newer, more rugged motor gives ½" capacity in hard wood and ¼" capacity in steel with a full load speed of 1200 R.P.M. Durable, mirror finished, lightweight aluminum housing. Features Universal, series wound ACDC motor; heavy duty multiple thrust ball bearings; automatic release trigger switch with locking pin; 6 ft. 2 conductor, UL approved cord and plug, Standard 115 V, ACDC. This powerhouse measures 9" in length yet weighs only 3½ lbs. If you've ever needed a drill or find that your present ½" job just won't do the things you expect of it, ORDER THIS 2.9 AMP. ¼" RAM DRILL TODAY! Limited quantities.

SCOTT MITCHELL HOUSE, INC.





ADD TO 25 POUNDS of SOLID MUSCLES NOTHING

S10 Body Mold course included FREE with Dan Lurie Barbells. Only Dan Lurie Barbells and "Body Mold" courses produce such amazing results. 15 minutes a day can make you a bigger man. Send today for details. Order now at lowest factory price. 50 lb. set \$ 8.98 150 lb. set \$21.98 100 lb. set \$14.98 200 lb set \$27.98 Semisteel sets approx. 10% higher. Extra wts. 14c per lb. Send 50% cash, balance C.O.D. F.O.B. Plant. Dan Lurie Barbell Co., 52 57 Bristol St. Dept. 970-G Brooklyn 12, N.Y.

HIGH INCOME QUICKLY

Become a Professional Building Estimator through comprehensive 18 unit home study course written by the foremost estimator on largest general construction projects. This newest profession commands top salaries in building industry, offers security and unlimited advancement possibilities. Complete General Construction Estimating Course provides all tools and techniques necessary to step into high paying job. Write today for free and complete information on career in estimating to:

Builders Publications, Inc. Dept. PS-B. P.O. Box 5056, Pasadena, Calif.



\$\$\$ TREASURE \$\$\$

New transistor metal detector finds lost or hidden treasure, coins, gold, silver, jewelry, relics. Profitable hobby. New underwater metal detector detects sunken ships, outboard mo-tors, etc. in up to 300 feet of salt or fresh water. Operates from a boat. Scintillation counters. Many other models. Free catalog.

GARDINER ELECTRONICS CO. 2545 E. Indian School. Phoenix, Arizona

ENJOY NEW FREEDOM

of action, peace of mind and comfort at work or play. Proven, patented MILLER holds your rupture back Day and Nightwill bring you lasting relief, has helped thousands.

For FREE facts in plain wrapper-Send Name and Address to

FRED B. MILLER, Dept. 3-K **Exclusive Manufacturer**



HAGERSTOWN, MARYLAND



ENGINEERING



in September.

Photo of Heald Students in Electrical Laboratory

Enroll Now for New Term

Heald College Ranks FIRST West of the Mississippi in "Who's Who in America"

Send for FREE Information

Heald Engineering College

Est. 1863 Van Ness at Post, Dept. PS-759 San Francisco, California Heald Trained Engineers are Moving Ahead and Winning High Positions Throughout American Business and Industry.

BACHELOR OF SCIENCE DEGREE, 27 MONTHS

Degree Courses:
Electronic Engineering
Electrical Engineering
Highway Engineering
Mechanical Engineering
Structural Engineering
Civil Engineering

☐ Architecture
Diploma Courses:
☐ TELEVISION ☐ Color TV
Industrial Electronic Tech.
☐ Tool & Die Design
Architectural Drafting
Mechanical Drafting
Structural Drafting
Approved for Veterans

AME	
REET	
TY	
ATE	

Classified Ads only \$1.10 per word insertion, payable in advance. Minimum ad 10 words. To be included in September issue, copy should be in our office by July 23. No cancellations accepted after July 15. Address orders to O. K. Kelly, Classified Adv. Mgr.

AUTOMOBILES & MIDGET CARS

CROSLEY or Foreign car parts catalogue. Parts discount club. Box 7, Elmont, New York.

HUNDREDS of automobile catalogs— American, antique, foreign; dealer books, glossy photographs, shop manuals; free motor magazines listed by non-profit organization. Write immediately; get on free mailing list. Auto Maniacs, Stockbridge, Michigan.

1959 CATALOG on Parts Kits for Golf Buggy or Jr. Sports Car 25c. Indus Corporation, 1815 Madison, Indianapolis.

"CAR Costs"—reveals dealers cost all 1959 American, foreign cars, small trucks, Limited time \$2.00 Postpaid, Parker, Box 254-S, Kenney, Ill.

BOYS, Power-Driven Auto, Two Passenger, Plans, Price List of Parts, 35c. Sypher Co., Sta. F, Toledo, Ohio.

AUTO SUPPLIES & EQUIPMENT

SAVE money on Jeep and army truck parts. Large inventory. Catalogs for Jeep and G.M.C. owners. American Auto Parts Co., 1830-PS Locust, Kansas City, Missouri.

1959 EDITION. It's New! It's different! Get world's largest auto accessories and parts catalog, save up to 50%. 308 pages, over 85,000 items for 1920 to 1959 models including Hollywood accessories, custom styling and Hi-Speed Equipment. All parts and accessories for all cars and trucks. We have that hard to get part. Jam packed with bargains. Completely illustrated. Send 25c (refundable). J. C. Whitney, 1919 PS-7 Archer, Chicago 16, Ill.

GIANT Auto Parts Catalog. Thousands Special Accessories Stores Don't Handle . . . Gadgets. Custom Equipment. Send 25c (Refundable). Newhouse Automotive Industries. 5805-PS-7 Beverly, Los Angeles 22, California.

RING-Valve job while driving, \$6.00. Eighth successful year. Free details. Motaloy. Grantham 27, Penna.

AUTO shop welding repair training in world's largest non-profit school. Low tuition. Free booklet. Hobart Welders, Box P-791, Troy. Ohio.

STEERING Wheel-Midget, etc. \$3.95 up. Literature 10c. Steerite Products, Dept. PS7, Box 221, Long Branch, N. J.

PAY 1c on the dollar or less on Government Surplus Jeeps, airplanes, boats, thousands of useful items. Buy direct from U.S. Government. Anyone can! Mail \$1.00 for 1959 directory of depots and how to buy. Western Metal, Dept. 107, Box 954, Dallas 21, Texas.

MEN! Motor Fouled, Burn Oil, Valves Click? Save Dollars With "Trucker's Secret." Guarantees Better Performance. \$2.00 Postpaid. Random, 212D Newcastle, Syracuse 4, New York.

PARTS—Model A—Free List. Matco, Box 135. San Pedro, Calif.

AUTO TRAILERS

BUILD Expanding eight foot trailer. Accommodates five. Literature 10c. Fra-Mar Company, Wilmington, Massachusetts.

ALUMINUM Pickup Coach Kits. Trailer blueprints. Literature 10c. Comstock Trailers, Parsons, Kansas.

MOTORCYCLES, BICYCLES AND SUPPLIES

1000 MOTORCYCLE Bargains, Parts— Equipment. Buy, Sell, Trade Anything. Catalog 25c. Bunico, 146AB, Covington, Virginia.

USE THIS HANDY INDEX TO FIND WHAT YOU WANT

Air Conditioning Antique, Relics & Indian Goods	3A96A22315
Boats, Outboard Motors. Body-Building Courses, Jiu Jitsu. Etc Books & Magazines. Business Opportunities Business Service, Information, Name	6 12 23 37 50 8A
Camping Equipment & Tents. Cartooning, Sign Painting, Chalk Talks. Coins & Currency. Color Photo Finishing.	16 16 16 26 2A
Do-It-Yourself Dogs, Birds, Hamsters & Pets	47 36 17
Electrical Supplies & Equipment	10
Field Glasses, Telescopes	19 14 80 71 89
Geiger Counters, Treasure Finders	77
High-grade Salesmen Hobbies, Collections Home Craftsman	14 14 31 35 24
Inventions Wanted	31
Jokes, Games, Novelties, Etc2	IA
	18
Machinery, Tool Supplies, Etc	9 25 30 79 84 33 4 35
Old Gold, Jewelry, Watches	70 37 27
Patents For Sale. Personal Photo Finishing, Photocopies, Etc. Plastics Plays, Stories, Etc. Poultry & Supplies Printing, Multigraphing, Etc. Printing Outfits, Supplies	59 82 80 80 49 21 58 22
Radio, TV, Supplies & Equipment	36
Science & Chemistry	41
Etc	15 28 9B
	75 13 88 20 9A
Watch Repairing	72 78 73 8

RECONDITIONED Motorcycles and motors. Chromium accessories. Complete stock Indian parts. Expert rebuilding, Fast service. Indian Motorcycle Sales, Kansas City 27, Missouri.

SERVICYCLE \$20.00; Whizzer Motorbike \$25.00; Cushman motorscooter \$25.00; midget auto \$25.00. Rush 25c (35c first class mail) for new catalog #963 listing many other amazing bargains in motors, midget cars, motorscooters, motorbikes, construction plans. Associated, Box 534, Toledo, Ohio.

CUSHMAN motorscooter \$15, Micro-midget \$20, less engines. Boys midget racer \$25, Go Cart \$55. Harley motorcycle \$50. (Mailorder only). Send 25c (35c for first class mailing) for 32-page Directory-Catalogue Number 90, listing these and hundreds of similar bargains, homebuilders parts, plans, etc. Midget Motors Directory, Athens, Ohio.

AVIATION

HOMEBUILT Helicopter Handbook \$1.00. Homebuilt Helicopter Directory \$1.00. Urshan, Box 4332 N.P. Station, San Diego 4, California.

"CAPTIVE" Helicopter, uses chain saw engine. Complete plans, illustrated instructions, \$3.00. Flight Dynamics, Box 5443, Raleigh. N. C.

PROPELLERS, plans, supplies for airboats and snowplanes. Latest designs, prompt delivery. Catalog 25c. Banks-Maxwell, Box 3301G, Ft. Worth 5, Texas.

DUCTED fan design. Used in V.T.O.L. aircraft and flying platforms. Specifications and five pages of drawings. \$2.00. Tyna-Turbine, Box 11253, Phoenix, Arizona.

BUILD—Fly fast sport planes—Four proven, economical designs—One, two passenger—Simplified blueprints, instructions—No experience required—Complete details, brochures, photographs, 3-views—Mail this ad, with \$1.00 (packaging, postal expenses). Ray Stits, Box 3084S, Riverside, California

FLYING Platform. Three Drawings. \$2.00. Rotron. Box 573-N, Bellflower, Calif.

HELICOPTER, Kits, Plans. Free Brochure. Adams, Box 6042-N, Lakewood, Calif.

ASTRONAUTICS

5A

GRAVITY latest undisclosed theories and information \$1.00. G. and P. Research Lab., Box 674, Bristol, Tennessee.

ELECTRICAL SUPPLIES & EQUIPMENT

BOOK 200 Electric Stunts \$1.00. Cuttingson, 26278 Arastradero, Los Altos, California.

REPLACEMENT Parts. all rectifiers, DC Power Supplies. Build-it-yourself kits for all applications. Electrical Division, 1624-K East First, Los Angeles 33, California.

LAMP parts. Wholesale. Thousands of items for repairing, converting. Catalog 25c. Brown Lamp, Box 305-D, Clayton 5, Missouri.

ELECTRICIANS! Bend conduit easily, correctly. Latest "Simplified System" \$3.00. William Goforth, Box 455A, Clarks-ville, Tenn.

APPLIANCE Parts Wholesale, Catalogue 25c, Seco. 26 South 20 Street, Birmingham 3, Alabama.

PLIABLE sheet plastic conducts electricity. Sample \$1.00 (no stamps). S. & L. Signal Co., 525 Holly Ave., Madison 5, Wisconsin. FREE bargain catalog. Fans, motors, rewinders supplies, instructions. Modern, Box 8715, Kansas City 14, Mo.

8 WELDING, SOLDERING

WELDERS, 110/220. Welds 1/2". \$39.50. Morris, 1070 Inner Drive, Schenectady, New York.

300 AMPERE J&H Aircraft R-1 Generator Carbon Brushes 75c each. Benjamin Sales Co., 3235 Fenkell, Detroit 38, Mich.

9A TRIGONOMETERS

ENGINEERS, Draftsmen, Students: Triangulator Makes Trigonometry Easy. \$1.25. No C.O.D. Trical, Box 67, Buffalo 15, New York.

10 ENGINES, MOTORS, ETC.

DIESEL Injector Parts and Fuel Pumps Wanted GM51-71-110. Mayer, 7120 Carnegie, Cleveland 3, Ohio.

REWIND Motors Yourself. Complete Instructions, \$1.00. Lewis Mfg., Howell 11, Michigan.

10A FARM MACHINERY

SENSATIONAL Garden Tractor. Hoes between plants and rows, including strawberries. Eliminates hand hoeing. Standard in size, yet entirely different. Patent 2742840. Also tills. Fantastic offer to first few inquiries. Auto Hoe, DePere 69, Wisconsin.

BUILD your own Hydraulic Ram—irrigate free from creek. Booklet on Rams \$2.00. Blueprints \$5.00—both \$6.00. Hydraulic Rams, 2258 W. Holden, Seattle, Washington.

11 BOATS, OUTBOARD MOTORS

NEW, used, rebuilt marine motors. Marine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Coldwater, Mich.

SAVE! Save! Save! World's Finest Boat Kits—25% less! Satisfaction Guaranteed! Write for free color catalog. Dept. PSM-759, Taft Marine Woodcraft, 636 39th Ave., N. E., Minneapolis, Minnesota.

KIT Boats in molded Fiberglass or preassembled plywood. 50 Guaranteed models. \$41.75 up, freight paid, easy terms. Free catalog includes hardware, fiberglass supplies, trailers. Luger Boats. Dept. K-7. Minneapolis 20, Minnesota.

ROPE, Nylon or polyethylene wholesale prices. Wolfe Specialties Inc., 350 Stanford, Akron 14, Ohio.

BOAT Plans—Full Size Patterns—Frame Kits. Modern Inboards and Outboards for amateur builders. Complete New Catalog 50c or specify requirements. Glen Marine, 9152 Rosecrans, Bellflower, Calif.

FULL size, cut-to-shape boat patterns. blueprints, 7½-38 feet. Big new 88 pg. illustrated "Build a Boat" Catalog of Naval architect-designed Cruisers, Runabouts, Skiffs, Outboard Boats, Sailing, Racing, Houseboats, 50c. "How to Build a Boat" Booklet, \$2.50. Hardware & Equipment Catalog, \$2.00. Cleveland Boat Blueprint Co., Dept. A-77, Box 1651, Cleveland, Ohio.

12 BODY-BUILDING COURSES, JIU JITSU & ATHLETIC EQUIPMENT

BUILD powerful arms, chest, shoulders! 22 exercises, \$1. Fonsad, Box 601-C, 1100 Market, Wilmington 99, Delaware.

YOURS—a body like a Greek God! Startling, amazingly Quick New method explained in free literature. Send name and address to: DeVel-O-Flex, 3607 W. Magnolia Blvd., Burbank, California.

BARBELLS, Dumbbells, Courses, Apparatus, Booklet 10c. Good Barbell Co., Siloam Springs, Arkansas,

BARBELLS. Exercise Equipment, Booklet, Health. Strength, Physique 10c. Reading Barbell Co., Reading, Pennsylvania.

PUSHED around? Don't take nonsense from bullies. Surprise them. Easy when you know Police Jiu Jitsu. Complete fully illustrated course in one volume as taught police and armed forces. Send \$1 now. Satisfaction guaranteed. Books Publishing Co., Amityville 39, New York.

14 FIELD GLASSES, TELESCOPES

DYNASCOPE-amazing world famous reflector telescope. Request free brochure. Criterion, Dept. DS-62, Hartford. Conn.

PREE Catalogue! Thousands war surplus optical bargains. Lenses. Prisms, Telescopes, Binoculars, etc. Send \$1.00 for 10 Lens Hobbyist Set and Project booklet. G. Jaegers, 691 West Merrick Road. Lynbrook, New York.

BINOCULARS, Telescopes, Microscopes, Terrific values \$3.98 up. Request free money-saving catalog. Criterion, Dept. S-80, Hartford, Conn. WAR Surplus bargains! Millions of lenses, instruments, telescopes, binoculars, components and complete line of astronomical telescope items. World's greatest optical market place! Send only \$1.00 for beginner's 10-lens kit and big instruction booklet Stock 2-CN. Write for catalog-CN Free. Edmund Scientific Co., Barrington, New Jersey.

TELESCOPES, Binoculars — all sizes. Complete optics, parts, accessories for telescopes. Free catalog. Suffolk Science, Mattituck, New York.

REFLECTING Telescope completely assembled. 60X. Guaranteed Observatory clearness. Free information. The Skyscope Co., P. O. Box 55, Brooklyn 28, New York.

STAR—Atlases, astronomical books, free list, Herbert Luft, 69-11 229th St., Flushing 64, N. Y.

BUILD your own Reflector Telescopes, complete kits; Mirrors, Eyepieces, Tripods, all other accessories. Request free illustrated literature. Criterion Manufacturing, Dept. KP-55, Hartford, Conn.

REFLECTOR Telescopes from Esco. Assembled and "do-it-yourself" telescopes from \$7.50 (3") to \$175 (12"). Complete line of optics and accessories. Send for free illustrated booklet. Esco Products Company, Oakridge, N. J.

TELESCOPES—refractor, reflector, kits and accessories. Free illustrated booklet. Dell Optics Co., Limited, Dept. PS, 329— 55th Street, West New York, New Jersey.

AMAZING prices, precision binoculars. Folder "Binocular Selecting." catalog free. Dealers also write. Prentiss Importers, Mercury Bldg., West Los Angeles 25, Calif.

15 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY, TRAPPING

100.000 PRODUCTS Wholesale — Free catalog! Send postcard: Econ-O-Mart, Whippany 16. New Jersey.

FREE . . . Wholesaie Catalog. Beads. Spinners. Lure parts. Sinker molds. Jigs. Reels. Finnysports, (PE), Toledo 6, Ohio.

CROSSBOWS! Hunting-Bows! Factory Prices! Jayco, Box 1355. Wichita, Kansas.

6-SHOT Colt Revolver. 22 Cal. Short Ammunition, Not blank. \$12.50, F.O.B. Chicago, Import Associates, Dep't. PS7, 185 N. Wabash, Chicago 1, Ill.

5,000 BARGAINS, firearms, binoculars, war relics, catalog 50c. Smith Museum, Runnemede, N. J.

NEW Tigerworm, nature's tough, lively worm catches fish. 2 packages \$1.00 ppd. Free fishing secrets in each package! Cash in advance. Tigerworm, Forsyth 8, Montana. Dealership open.

GOLFERS! Beat Bragging Buddies. Substitute Off-Center Golf Ball. It Slices, Hooks; Wobbles Like Crazy On Green. 75c, 3 For \$2.00. Wilson \$1.25 Golf Balls, 3 For \$2.25. Hilarious Business Cards Each Order. 25c Postage. Hall 212B Newcastle, Syracuse 4, New York.

10,000 GUNS!!!—Swords—Kentuckies—Colts—Lugers—Hunting Guns!!! Bargain Catalog—50c. Agramonte's, Yonkers 2-A. N. Y.

CAMPERS . "Equipment we like Best" catalog, camping equipment handbook and buyers guide. 25c postpaid. Merritt Products, Box 104PS, Des Plaines, Illinois.

BOOMERANGS postpaid from Australia. 16"-\$3.00, 2/\$5.00; 20"-\$4.00, 2/\$7.00; 22" -\$5.00, 2/\$9.00, Stanley E. West, Dept. PS79, 11168 Santa Monica Blvd., Los Angeles 25, California.

POOL-GOLF: build intriguing new indoor-outdoor game. Plans \$2.00. Crawford Amusements, Inc., Lebanon, Ohio.

SPIRALURE—A Lure That Is Original And Different. The Action Is New To Any Other Lure. Patent Pending. \$1.50 Each. Stainless Steel Keels 25c Each. Jan Engineering Co., Dept. F. P. O. Box 68, River Grove. Illinois.

JAP rifles altering American shells \$6.00. Jap shells \$3.95, catalog 10c, TP Shop. West Branch 10, Michigan.

MOLDS for Fisherman's Sinkers. Jigs, Squids. Casting and Spinning Lures. Free Catalogue. Sweet's Molds. Tonawanda 3, New York.

154 PAGE catalog—a real "Dream Book" for fishermen! It's free! Netcraft Company, Dept. A-7. Toledo 13. Ohio.

16 CAMPING EQUIPMENT & TENTS

DON'T buy anything until you've seen the "New Look" in camping. New camp trailer, a new cartop camper, new camp kitchen. Free illustrated brochure. Write: Heilite Trailers, Inc., Dept. P.S., Lodi, California. CAMPING Equipment, world's largest selection, low prices. Send 25c (print name-address) for 160 page complete catalogue of Tents. Camping Equipment, national camp sites guide & Camping Handbook. Morsan, 10-15G 50th Avenue, Long Island City 1, New York.

17 DOGS, BIRDS, HAMSTERS, RABBITS & PETS

RAISE rabbits on \$500 month plan. Plenty markets. Free details. White's Rabbitry, Delaware, Ohio.

FLYING Squirrels. Beautiful pets. Literature, prices and pictures 10c. Greesons, 905 North Monroe St., Arlington. Virginia.

PRAIRIE Dogs, Horned Toads, Baby Raccoons, Snakes, Turtles, Catalog 10c. Ray Singleton, Interbay Station, Tampa, Fla.

RAISE Rabbits—Profitable, easy! Particulars free. Grinsteads, Edwardsville, Illinois.

18 LIVE BAIT

FREE Literature—Big money raising fishworms and crickets. We teach you how to raise and sell. Breeder redworms—\$4.00 per 1000, postpaid with raising and marketing instructions. 5000—\$17.50. Medium size—10.000—\$19.95. Carter Farm-12, Plains, Georgia.

RAISE Earthworms For Profit; 31 Page Booklet For 35c Tells How; 1.000 Earthworms \$4.00: Angler's, Box 265, Malibu, California.

AFRICAN Giant Earthworms, 100— \$2.00, 500—\$7.00, (Dealers Quoted), Ozark Worm Farm-V, Willow Springs, Missouri.

19 FARMS, OTHER REAL ESTATE

STROUT Catalog-Free! Farms, Homes, Businesses. Bigger than ever. 3,599 bargains, 36 States, Coast-to-Coast. World's Largest! 59 Years' Service, Strout Realty, 251-ZB 4th Ave., New York 10, N. Y.

LAKEFRONT. Highway, Acreage and Trailer lots, from \$295.00. Fifteen central Florida developments. Monthly terms. Box 2005, DeLand, Florida.

FLORIDA—Nice homesites, \$345 at \$10 monthly. Folder Free. Winfree Vernor, DeLand, Florida.

22 PROFITABLE OCCUPATIONS

EARN Money At Home raising fishworms for us! Backyard, garage, basement. We buy your crop! Inquire. Oakhaven-7, Cedar Hill, Texas.

SAVE Money! Buy Wholesale! Free Catalog General Merchandise. Norris, 487-H Broadway, New York.

\$5000 FROM Half Acre growing Ginseng, crop bought. Particulars 10c. Associated Growers, Sperling, Manitoba.

OPERATE amazing new mail order plan! Free Details. Ivan Robison, 1414 Ridley Ave., Santa Rosa, California.

WATCH Repair Course, 70 Illustrations, Guaranteed \$1.00. Web Service, 1890 So. Hooker, Denver 19, Colorado.

VENDING Machines—No Selling. Operate A Route of Coin Machines and Earn Amazing Profits 32-Page Catalog Free. Parkway Machine Corporation, Dept. 17, 715 Ensor Street. Baltimore 2, Maryland.

TREE-mushroom pioneers! Spawn. Instructions, \$1.00. Ohga, PS152, Sigakenkusatu, Japan.

INVESTIGATE Accidents—Earn \$125 week to start. Claim Investigators are urgently needed to investigate more than 490.000 accidents daily. Work full time for insurance company, railroad, steamship line, or government office. Or step into your own profitable spare time business. No experience needed. Free book, now! Universal Schools, B-7, Box 8202, Dallas 5, Texas.

BECOME independent with your own franchise business. Thousands earning handsome incomes. Request interesting facts today. National Franchise Reports, PS-528, 333 North Michigan. Chicago 1.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-10, Plains, Ga.

3 BOOKS & MAGAZINES

GOOD Used Books, 50c-\$1. Free Lists, Editions, Dept. PS, Hempstead, New York.

BRITISH Book Bargains. Any subject. Catalog free. Transbooks, Box 1-PT, Wantagh, N. Y.

BOOKHUNTERS: All Subjects. Send Wants! Jaher Book Service, 183 Hazelwood Drive, Westbury, New York.

SCIENCE-Fiction Book Bargains. List Free. Werewolf Bookshop, Verona 1, Pennsylvania.

ATHEIST Books, Catalogue free, Truth Seeker Co., 38 Park Row, New York 8 DISPOSALS. Until Sold Out: 8 Books \$1.00. Big Mail-Amazing Samples-30c. Persil, 436 N.Y. Ave., Brooklyn 25, New York.

COMICS, Magazines wholesale-retail Catalogue 10c. Backdates, 1181 East Lombard, Baltimore 2, Maryland.

PROFESSIONAL secrets trick mind reading, spirit writing. Profitable. \$1.00. Box 2832. San Diego 12, Calif.

PHOTOGRAPHY & Men's Magazines Back Issues, Special Sample Assortment, 6 Different ones, \$1.00 Postpaid Magazine Bazaar Export, 507 West 56th Street, New York 19, N. Y.

BOOKS, Free General Catalog, 100 pages. Text, vocational, educational, instructional subjects. Millions of volumes, new and used. Bargain prices. Books bought. Est. 1902. Long's College Book Co., Dept. PS, Columbus 1, Ohio.

1,000,000 BOOKS—10c each! Every subject under the sun! 2 catalogs—120 pages—dime! Modern Mailway, Box 124-PSS, Stuyvesant Station, New York City 9.

24 HYPNOTISM

HYPNOTIZE Self Others while asleep with amazing hypnotic phonograph records, tapes. Catalog free. Research Association, Box 24-G, Olympia, Washington.

FREE Illustrated Hypnotism. Selfhypnosis Catalogue. Write: Hypnotist, 8721 Sunset. Hollywood 46P, California.

FREE Catalog! Hypnotism, Autohypnosis! Books, Tapes, Records! Drawer PS697, Ruidoso, New Mexico.

XRAY Mind! Hypnotize, one glance. Guaranteed \$3.00. Wamsteker, Box 10, Ottery, Cape, South Africa.

WHIRLING Hypno-Coin, hypnotize others in minutes with this fascinating plastic invention. Complete with revealing secrets, instructions. Only 99c. Money back if not delighted. Hypnotic Aids, PS-7, 1133 Broadway, New York City 10.

HYPNOTISM! Autosuggestion. Home-Study Course with Phonograph Recordings, Guarantees Amazing Results. Diploma Issued. School Applied Hypnology, Dept. B, 200 West 57th Street, New York 19, N. Y.

HYPNOTIZE, One word, one glance, complete course, only \$1.00. Satisfaction guaranteed. Quality Book Co., 545 East Broad, Athens, Ga.

HYPNOTIZE Successfully! Learn Easy, Fast, Modern Methods. Complete, Illustrated Course, including self-hypnosis and "Secret Nerve Pressure Technique" (Guaranteed Harmless)—\$1.00. H. Fowler, 608 No. Broad, Woodbury, New Jersey.

"HYPNODISK" 50c. "25 Lessons Hypnotism" Book 50c. Box 1352-H, Philadelphia 5.

"HYPNOTIZE . . . One word . . . One fingersnap," on stage. Satisfaction—or refund. \$2. Hypnomaster, 846-S5 Sunnyside, Chicago 40.

HYPNOTIZE instantly. One Word.—One Glance; On Stage. Only \$1.00. Satisfaction or refund. Unique Books. 1412-A Great Northern Building, Chicago 4.

TECHNIQUE Of Hypnotism \$1.00. Leo Niedzwiecki, 333 Fulton St., Elizabeth, New Jersey.

MASTER Course write J. Fisette, 733 North Fulton, Fresno, Calif.

NEW—"Dynamic Hypnotism." Learn To Control Self And Others. Easy Method. Guaranteed. Explains How To Use Power Of Mind. Psychoanalysis, Instant Hypnotism Group Demonstrations And More. Improve Self. Make Money. Send \$1.00. Sanderson Goode, Box 382, Springfield, Ohlo.

24A JOKES, GAMES, NOVELTIES, ETC.

INSULTING cards—fifty different \$1.00—dozen 25c. Box 1044, Culver City, California.

25 MAGIC TRICKS, PUZZLES, ETC.

WORLD'S finest professional magic Joker novelties. Giant illustrated catalog 10c. Top Hat. Evanston 13, Illinois.

3100 NOVELTIES. Jokes, Tricks. Gadgets, Funmakers, Hobbies. Big catalog 10c. Johnson-Smith, D-490, Detroit 7.

just 10c. This book of 120 pages describes magic tricks for pocket, parlor and stage. Magicians, both professional and amateur depend on Douglas for fastest service. Amaze your friends—send 10c today. Douglas Magiciand, Dept. (S), Dallas, Texas.

WIN, Dice, Cards, Catalog 10c. Book, Box 671, St. Louis 1, Missouri.

BE A Magician! Professional Trick and Large Catalog latest tricks \$1.00. Ireland. P-109 North Dearborn, Chicago 2. "VENTRILLO" Voice Thrower 25c. Ventriloquist's Puppet 75c. Box 971-PS, Philadelphia 5.

MAGIC, Jokes, Disguises. Catalog 25c. Hocus Pocus, 209 West Capitol, Jackson, Mississippi.

BUY 1000 Tricks direct. Amazing savings. Big 160 Page Picture Magic Catalog. Free trick plus Five Free Offers—all for 25c (Summer Special). House of 1000 Mysteries, 202M Pinewood, Trumbull, Conn.

"SMOKEPOTS", 25c, 7/\$1.00, 50/\$5.00. Voluminous! 4463-PX Greene, Philadelphia 44.

6 COINS & CURRENCY

FREE List! U.S. Coins. Lowest Prices. Hugh's, Box 361-SP, Hickory, North Carolina.

COIN Magazine, 200 pages. Sample 40c. Numismatic, 7320 Milwaukee, Chicago 31.

INDIAN Cent plus Bargain Lists 10c. Hutchinson's, Box 4747, Philadelphia 34, Penna.

RARE 1880 to 1885 CC Dollars, \$5.00 ea. Coin Catalogue 25c. Shultz, Salt Lake City 10, Utah.

COMPLETE U.S. Coin list, 10c (Refundable). Bonus offer included! Economy Sales, 156-C Dean, Mansfield, Massachusetts.

9 DIFFERENT, Genuine, Foreign, Coins—Bills—25c. Jolie, Roslyn Heights, New York.

60 SPLENDIDLY Assorted Coins, \$1.00. Oddehon, Box 482, St. Louis, Missouri.

BRILLIANT Proof Sets—1959-\$2.75; 1958-\$3.50; 1957-\$3.25; 1956-\$3.95; 1955-\$5.95; 1954-\$6.95. World's Greatest Bargain Catalogue \$1.00 (Deductible first \$10.00 order). Retail Guidebook \$1.75; World Coin Book \$4.00. Bebee's, 4514 North 30th, Omaha 11, Nebraska.

U.S. coin list 10c Contains over 100 illustrations; over 5,000 delightful bargains. Stoney, 260 Washington, Boston 8, Mass.

JOIN Coin Club. Free Periodical. Nationwide, 1274 East 93rd, Brooklyn 36, New York.

1959 CANADIAN silver dollar \$1.50. Marles, Dept. 16-S, Box 833, Calgary, Canada.

TEN Different Indian Cents \$1.00; Free List. Collector's Bargains, Box 356A, New Hope, Penna.

\$4,000.00 FOR 1913 Liberty Head Nickel. Uncirculated Dollars 1804-1839, 1893-S, 1895-P, 1903-O pay \$100.00-\$5,000.00. Certain Dates—Lincoln Cents before 1932—\$125.00; Flying Eagle Cents—\$500.00; Indian Cents—\$175.00; Dimes before 1943—\$2,000.00; Quarters before 1924—\$1,500.00; Half Dollars before 1929—\$3,000.00; 2c Pieces—\$125.00; 3c Pieces—\$150.00; Half-dimes—\$1,500.00. Hundreds of others worth \$10.00-\$1,000.00. Canadian Coins—1921—5c Silver—\$100.00. 1875 Quarters—\$100.00. 1921—5c Silver—\$750.00. Wanted—20c Pieces, Gold Coins, Paper Money, etc. Our Large Illustrated Guarantee Buying-Selling Catalogue, Giving Complete Allcoin Information—send \$1.00. Purchase Catalogue before sending coins. Worthycoin Corporation (K-285-C), Boston 8, Massachusetts.

LINCOLN Cents: 1913-S, 1926-S, 1923-S, 1924-S, 1921-S, 1927-S, 1928-S, 1933-D, Complete lot only \$3.00. Berry, Box 306, Westminster, Calif.

NEW! Whitmans 13th Edition U.S. Guide Book \$1.75. Sadler, Cumberland Gap, Tenn.

SIXTEEN page price list of USA and Canadian coins free. Selling prices on thousands of coins and supply items. Bryson Inc., 612A White, Toledo 5, Ohio.

INDIAN Cent With Price List 10c. R&M Coins, Delanco, New Jersey.

GENUINE Mexican Silver Dollars 50c Each, Three for \$1.00. Bargain List With Order. Universal Services, Box 675-A, San Antonio 6, Texas.

6 DIFFERENT 50c size Commemorative Medals all Brilliant Uncirculated \$4.95. Catalog free. Joray's, Shouns, Tenn.

WORLD Paper Money Collectors Handbook—\$1.00. Manor Coins, Dunbar, West Virginia.

NEW 1959 Penny Plus Catalogue; 10c. Grayson, 2073 Dauphin, Mobile, Alabama.

SILVER Dollars. Brilliant. Uncirculated. 1878-CC, 82-CC, 83-CC, 84-CC, 83-S, 98-S, 1902-S, Only \$4.00 each! 80-CC, 81-CC, 85-CC, 90-CC, 91-CC Only \$4.90 each! 1878-S, 79-S, 80-S, 81-S, 82-S, 1921-S, 83-O, 84-O, 85-O, 79-P, 83-P, 84-P, 85-P, 86-P, 87-P, 89-P, 90-P, 97-P, 98-P, 1921-PM, 1922-P, 1923-P, 1924-P, 1925-P, 1921-D, Only \$1.50 each! Proof sets: 1959 Only \$2.50! 1958—\$3.50, 1967—\$3.00, 1956—\$4.00, 1955—\$6.00, 1954—\$7.00, 1953—\$12.00, 1952—\$18.00, 1951—\$29.00, 1950—\$50.00. Harry's—Harry Warner, Box 421-PS, Mill Valley, California.

I'M Buying Coins! New Higher Prices! My Confidential Buying Guide Only \$1.00! Hubers, National Building, Minneapolis, Minnesota.

28 STAMP COLLECTING

225 STAMPS For only 10c! This mammoth value includes Airmalls, Pictorials; stamps from strange Countries cataloguing up to 25c each! Also Approvals, Mystic Stamp Company, Camden 55, N. Y.

307 WORLDWIDE different stamps only 25c. Approvals. Niagastamp, St. Catharines 672, Ontario.

UNITED States commemorative collection containing 33 different-10c. Approvals. White, 516-W Avenue L. Brooklyn 30, New York.

1000 DIFFERENT Worldwide Stamps \$1.00. Valued over \$20.00. Universal, Box 6. Kenosha 6, Wisconsin.

WOW! 110 All Different Germany 10c Zeppelins, Semi-Postals, Airmails, High values, etc. Giant Catalog, bargain lists included with beautiful approvals. Jamestown Stamp, Dept. A79PS, Jamestown, N. Y.

103 DIVERSIFIED British Colony Stamps only 10c. Approvals. Niagastamp, St. Catharines 672-A, Ontario.

AMAZING Offer! 200 U.S. stamps-including commemoratives, airmails, high denominations to \$1.00-only 10c to Approval Applicants!! Illustrated Bargain Lists free. Mystic Stamp Co., Dept. 55, Camden, New York.

ALBUM only 10¢! Hundreds of spaces! Stampmart Company, Hartford 1, Connecticut.

102 DIVERSIFIED Worldwide stamps 10c. Approvals. Linstamp, St. Catharines 619, Ontario.

80 DIFFERENT U.S. Stamps. Includes 19th Century. Commemoratives, High Values. Plus 1943 Flag Stamp of occupied Nations. All for only 25c. Approvals included. Willett Co., Box 338-Y, Yorktown Heights, N. Y.

NUDES set (4)-Unusual Approvals 10c. Atlas, Eisenhower, Racine, Wisconsin.

FREE! Giant Bargain Catalog—New Edition listing thousands of bargains including U. S. and B. N. A. stamps, packets, mixtures, albums, accessories and supplies; sent with beautiful approvals. Jamestown Stamps, Dept. E79PS, Jamestown, N. Y.

25 DIFFERENT large American Commemoratives 10c. With approvals. Linstamp, St. Catharines 619-A, Ontario.

WORLDWIDE, 50 all different, absolutely free, just to introduce our incomparable approvals. Kent Stamp Company, GPO Box 87, Brooklyn, New York.

25 ATTRACTIVE Pictorials Worldwide different 10c. Approvals. Linstamp, St. Catharines 619-B, Ontario.

FIRST U.N. Set. Among World's Prettiest. Only 10c. Approvals. Welles, Box 1246-V, New York City 8.

1000 DIFFERENT, \$1.00 with approvals. Golden's, 6721 Eastwood, Philadelphia 49, Pennsylvania.

POLYNESIA girl, Ryukyu lion, Chiang birthday, Czecho mushrooms, Israel musicians, Ghana Nkruma, only 10c. Albums, catalogs, many others free our approvals buyers. Bell Stamp Service, PS9, Bell, California.

LOOK! Six Different Queen Elizabeth Mint Sets! Antigua, Malta, Virgins Etc. 21 Bicolors 25c! Attractive Approvals! Gannon Stamps, Box 931, Canton 1, Ohio.

U.S., Canada, Catalogue send only 20c. New-Way Stamp, Lawrence (3), Massachusetts.

FREE Mint Set! Approvals accompany. Mintco, 5151 Princeton, Memphis 17, Tennessee.

100 DIFFERENT Austria 10c. Approvals. I. Aronson, Box F, Newton Centre 59, Massachusetts.

14,000 DIFFERENT! Amazing new plan builds your collection systematically, country by country. Only 50c weekly. Free detalls. L. G. Ware, Stepney 70, Conn.

OLD scarce U. S. seconds on approval. Slightly defective, bargain prices. Hearnfeld, Clintonhill Station, Newark 8, N. J.

FREE-Your choice 100 different Canada, 100 different Philippines, 100 different countries, each collection over \$5.00 catalogue value, plus many other terrific offers Free when you buy our sensational foreign approvals. Topval, Box 486(C), Redlands, California.

OLD U.S., Flags, Presidents, Commemoratives with approvals, free gift 10c handling. Metropolitan Stamps, Box 312CZ, Jackson Heights, New York.

FREE United States Plate Block Price List. Atlantic Stamps, 45-PS Bromfield Street, Boston, Massachusetts.

700 MIXED U.S. Various Issues 25c. Monjar, Fairmont, Cincinnati 14, Ohio.

FREE!! 50 Different Portuguese; Colorful, Inexpensive Approvals, Elkhart, Box 33, Elkhart, Indiana.

105 DIFFERENT U. S. stamps 25c, Approvals included, Shelron, Box 907-S, New York 8, N.Y.

77 DIFFERENT U.S.—25c Approvals. Utechts, 1143A North Keeler, Chicago 51.

INTERESTING Worldwide Animal stamp collection 10c. With approvals. Niagastamp, St. Catharines 672-B, Ontario.

FREE! Eight Sided stamp, Triangle, Diamond, Midget, Mammoth, to approval buyers. Plymouth, Dept. A-3, Bell, California.

U. S. Stamps, Glant Bargain Catalog— 15c. Raymax, 35-VX Maiden Lane, New York City 38.

DIAMOND Roosevelt, Pope Triangle, Greenland, Angola, 51 others 5c. Approvals. Longhorn, Box 3068P, Lubbock, Tex.

FREE-60 Different Stamps Free with Approvals. Stevison, 60 Randolph, Meriden. Conn.

100 U.S. commemoratives \$1.00, Country lots \$1.00 and \$5.00. Chas. Wokasien, Aronica Trailer Court, Hamburg, N. Y.

FREE United States Illustrated Catalog. H-S. 45-S Bromfield, Boston 8, Massachusetts.

FREE!! Wonderful Triangles showing Helicopters, Birds, Flowers, Athletes. 25 others. Approvals. Gotthardt, 1202 Hunter, El Paso, Texas.

FREE-Mint British Colonies from Brunei, Solomon Islands, Negri Sembilan, Sarawak, St. Christopher, Nevis, Trengganu, Gilbert Ellice. Free with approvals. Viking, Great Neck 5, New York.

200 U. S. Large Commemoratives, some 1937-\$1.00. Yonts, Denham Springs, La.

WORLD Wide Approval Sets. David Bailey, Box 5021, Los Angeles 55, Calif. FREE! 25 Egypt 5c handling, Approvals.

Bellet Stamps, Hazel Park, Michigan.

1000 MIXED Stamps With Approvals
25c. Homer Boster, Route 7, Chillicothe.

100 DIFFERENT Stamps, 10c with approvals, Smith, 508U Brooks, College Station, Texas.

100 OLD U.S. Stamps between 1861 and 1935 \$1.00. Rousch Stamps, 51 Chestnut, Mansfield, Ohio.

PENNY Approvals jammed with Bargains. For better values, try Putnam Stamp Company, Mahopac, New York.

FREE 200 Different stamps! Gift Magnifier! Free "Phootnotes" subscription! Approvals. Rush 10c postage. Philatelics, Dept. TA, New Paltz, New York.

153 DIFFERENT 10c including British Colonies and Israel—Approvals. Krehl, 1708-S Nebraska, Orlando, Florida.

FREE—Same Stamp Tongs Advanced Collectors Use. Also Stamps Cat. \$2. Approvals 10c. Reid. 441 N. 6. Allentown, Pa.

SURPRISE Mint Set Free For Introducing Bargain Approvals. Postage Paid Both Ways. Arnold Miller, 875 East 55 Street, Brooklyn 34, N. Y.

FREE Sample! Interesting, Informative, Illustrated. National Stamp News, Anderson. South Carolina.

WEIRD Diamond Shape Coffee Stamps. Lovely Flower Triangle! First American big commemorative, Greenland Idol Dancer, etc. 10c with approvals. Capital Stamp Co., Ferrysburg 10, Michigan.

PENNY Approvals! Regardless Catalogue! Kloster, 4164-52nd St., San Diego 5, California.

25 DIFFERENT Commemoratives 1893 up 10c. U. S. Approvals. K & B, Box 70, Brooklyn 23, N.Y.

60 DIFFERENT U.S. (30 Commemoratives) 25c. No approvals. Seidenberg, Appleton, Wisc.

135 DIFFERENT U.S. Stamps \$1.00. Stamps. 5000 Miami, St. Louis 9, Mo.

EXCEPTIONAL, 125 different, cataloging \$3.00, includes triangles, commemoratives, 10c, approvals. Reeves, Box 37597P, Miami 37, Florida.

TRADE your duplicates toward our approvals! (Foreign only.) Complete information, 10c. Variety Stamps, Box 98-S, Newton Highlands 61, Massachusetts.

ISRAEL, 3 Sets 10c. Foreign Approvals. Seaside Stamps, Box 3102, Hayward, California.

BRIGHTEN up your Mail! Foreign F.O.C.-s Mailed Direct. Free Offer to new subscribers. Brumsey, 209 Main, Peoria, Illinois.

1000 WORLDWIDE, giant catalogue, only 50c. Approvals. Stamport, Cyland Avenue, East Palestine, Ohio.

FLAG, Ship, Animals, many pictorials. Free with Approvals, Wirth, Route 6, Norwich, Conn.

SELECT U.S. on approval. Mint, used. Kingsbury Stamps, Groton, Vermont.

"MONACO Nudes" and Israel Ships 10c. Approvals. Jewells "Stamps," Tamaqua 2, Pennsylvania.

500 MIXED U.S. Stamps 15c. Wright, 201-P Mealey, Hagerstown, Maryland.

BARGAIN U.S. 51 different Commemoratives, 25c with U.S. approvals. Stamps, Kennebunk, Maine.

MYSTERY Bag Stamp Collection, only 10c. Hill Company, Box 51, Defiance, Ohio.

1000 DIFFERENT worldwide for approval. Buyers Only. Jacobsen, Crompond, New York.

DEALER'S Course, Consultation, \$3.95. C. White, 6462 83 Pl., Rego Park, New York

UNITED States Approval collections. Enclose 10c. Peterson. Box 31, St. Paul 2, Minn.

GODS Of Ancient Greece; Russia Sputnik; U.S. Aeronautics; Odd Bisected Stamp; Mother's Day; U.N.; Israel; Worldwide Grab Bag; Others Free When Buying Approvals. Stamp Farm, S1-16, Oxford, Wisc.

TOPS! Free book, "How To Collect Stamps." Send for your copy today! Approvals, Littleton Stamp Co., Littleton E2. N. H.

GIGANTIC Collection Free—Includes Triangles—Early United States—Animals—Commemoratives—British Colonies— High Value Pictorials, etc. Complete Collection plus Big Illustrated Magazine all free. Send 5c for postage. Gray Stamp Company, Dept. PR, Toronto, Canada.

29 ANTIQUES, RELICS & INDIAN GOODS

SCALPING Knife, Flint Thunderbird \$3.00. Catalog Free. Arrowhead, Glenwood, Arkansas.

SELLING 100,000 ancient Arrowheads, Spearheads, Tomahawks, etc. List free. Lear's, Glenwood, Arkansas.

30 MINERALS & PRECIOUS STONES

ILLINOIS: — Rockhounds — Visit Rockhound Paradise. Come Early. Schmagate \$1.00—Azurite \$1.00. Heike's Agate Shop, Wenona, Illinois.

EARTH Science - Rockhounds National Magazine, Subscription \$2.00. Sample 35c. Box 1357-PS, Chicago (90), Ill.

GEMCUTTING — Silvercraft magazine. Learn to cut gems, make jewelry. Ads give sources equipment, gems for cutters, collectors. Free literature. Sample copy 25c. Lapidary Journal, Del Mar 3, California.

"GEMS & Minerals Magazine," largest rock hobby monthly. Field trips. "how" articles, pictures, ads. \$3.00 year. Sample 25c. Box 687S, Mentone, California.

GET Free Catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free . new catalog just off the press—yours for the asking! Write Grieger's, Dept. C-14, 1633 E. Walnut, Pasadena, California.

15 APACHE Tears \$1.00. 15 assorted gem stones \$1.00, 15 petrified wood \$1.00 All highly polished. All for \$2.50. Apache Tear, 2502 N. 32nd St., Phoenix, Arizona.

SAPPHIRE and four more uncut gems, \$1.00. Ten polished gems, baroque-shaped, \$1.00. Free gem list, Lapidary catalogue 25c. O'Brien's, 1116N Wilcox, Hollywood 38, Calif.

POLISHED Gem Stones sent on approval to collectors, students, schools and hobbyists. New England Gem Company, Dover 4. Mass.

31 HOBBIES, COLLECTIONS

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors, Dept. 30-E, 635-F St., N.W., Washington 4, D. C.

TOY Soldiers, All Nations, Civil War. Catalog #2-35c. Bussler Miniatures, Dept. E. Box 107. Wollaston 70, Massachusetts.

MILITARY Souvenir Decals 14 Different \$1.00. Box 504, Nyack, New York.

WANTED - Cigarette, tobacco cards. Write Charles Bray, East Bangor, Pennsylvania.

EXOTIC Jungle butterflies, suitable for laminating, decorative, educational purposes. 12 assorted \$1.00. Guaranteed. Guttman Co., 257 So. Spring St., Los Angeles 12, Calif.

PHOTO FINISHING, PHOTOCOPIES, ETC.

ROLL Developed 4X6 or 4X4 prints, 8 exposure 50c; 12, 70c. 5X7 prints; 8, \$1.00; 12, \$1.40. Hagner, 1318 West Columbia, Philadelphia 22, Pennsylvania.

FAST Film Service, Kodacolor processing only 75c. Prints only 25c. Black and White: 8 Exposure 40c; 12 Exposure 60c; 20 Exposure \$1.00. Reprints 5c. Kodachrome, Anscochrome, Ektachrome Mounted \$1.35. Pinest Quality. Mail Order Photo Service. Box 297, Watertown, Wisconsin.

TWELVE Exposure rolls 49c. Wallets 20 for \$1.00. Lincoln Studies, Dept. L, Box 13. Lincoln, Nebr.

ENLARGEMENTS! Eight 5x7's or Five 8x10's from negatives, \$1.00. Wilart, Box 975, Little Rock, Ark.

KODACOLOR 12 Prints Guaranteed from any roll \$2.50. Trial offer with this adv. Reprints 20c each. Eli Photo Service, Box 1873PS, New Haven, Connecticut.

2 SETS Jumbo prints trial roll 50c. Dick's Photo, Louisville 12, Ky.

EKTACHROME Anscochrome 35mm processed \$1.25. Wallet prints from slides 25c. Kodacolor prints 25c. Send for free mailer kit. Acme Color Lab., Box 6025-PC, Minneapolis, Minnesota.

32A COLOR PHOTO FINISHING

FREE Bonus Certificate with developing. 8mm movie, 35mm-20 Exposure Ektachrome, Anschochrome, Kodachrome \$1.25. Write for mailers. National Color Corporation, Box 12155-E, Atlanta 5, Georgia, Box 8370-E, Chicago 80.

33 MOTION PICTURES, SLIDES SOUND EQUIPMENT

MOVIE Camera Film 8 mm roll \$1.50. 16mm 100' \$3.00. Free processing. Better Films, 742 New Lots, Brooklyn, N.Y.

HI-FI, Recorders, Free Wholesale Catalogue. Carston, 125-PS East 88, New York City 28.

FREE: Blackhawk's big sale catalog 8mm, 16mm, movies, 2"x2" color slides. Biggest selection anywhere! Projectors, cameras, supplies—big discounts! Get free, every three weeks, 12-page newspaper size bargain list! Blackhawk Films, Davenport 15, Iowa.

TAPE recorders, Hi-Fi components, Sleep Learning Equipment, tapes. Unusual values. Free Catalog. Dressner, 69-02 174 Street, Flushing 65, New York.

MOVIE Film! Free catalog! Eso-H, 47th Holly, Kansas City 12, Mo.

FREE Catalogues. 5,000 8-16MM Films. International Films, Greenvale, New York.

16M.M. Sound Feature Films \$20.00. Bedner, 5300 So. Talman. Chicago.

10c BRINGS big new Cine Manual for the 8mm-16mm Movie Maker. Save \$\$\$ on fresh B&W and Color Movie Film, all Home Processing Equipment. Superior, 442-448 N. Wells. Chicago 10.

16MM Sound—Silent, Free List. Torrington, Box 74636-S, Los Angeles 4, Calif.

34 CAMERAS, PHOTO SUPPLIES

164-PAGE Photographic Bargain Catalog, listing thousands of photographic bargains. Send 25c for your copy, credited on first order. Dept. 4-C7, Central Camera Company. 236 So. Wabash Ave., Chicago 4, Illinois.

POLAROID Highlander Camera \$51.90, Argus C-3 Matchmatic Outfit \$45.90. Tremendous Discounts, Photographic Equipment. Free Catalog. Mailers Mart, Pelham 2, New York.

PHOTOGRAPHY For Pleasure or profit. Learn at home. Practical basic training. Long established school. Free booklet. American School of Photography, 835 Diversey Parkway, Dept. 172B, Chicago 14, Illinois.

35 MUSICAL INSTRUMENTS, SONG WRITERS & RECORDS

SONGPOEMS and lyrics wanted. Mail to: TinPan Alley, Inc., 1650 Broadway, New York 19, N. Y.

SONGWITERS: Recording Company Wants new songs. Royalty basis. National sales, promotion if selected. No charge for melodies. Send material. Music Makers. Dept. G-49, Box 2507, Hollywood, California.

SONGS Into \$\$\$\$\$\$ — Share \$33 million dollars yearly for New Songwriters, Songpoets. Any subject, songs composed, published, promoted by largest firm. Information, appraisal Free. Send Nordyke Music Publishers, 6000 Sunset, Hollywood 28PS, California.

SONGWRITERS! Protect your ideas! Hold all poems, songs! Write for safe, correct procedure! Song Service, Dept. PS, 333 W. 56th, New York 19. POEMS Wanted for musical setting and recording. Send poems. Free examination. Crown Music Company, 49-P West 32 Street, New York 1.

ACCORDIONS—1959 Models. Lowest wholesale prices. Save up to 75%. Free home trial. Trades accepted. Big color catalog free. Accordion Manufacturers. Box P, 2003 Chicago, Chicago 22.

GUITAR Making, books, plans, imported woods, tools. List 10c. Wildwood, 510 East 11th Street, New York 9, N. Y.

SONGWRITERS, with publisher contacts, want song ideas. Share royalties. No fees. Send poems: Songwriters' Associates, 1650 Broadway, New York 19-F.

POEMS wanted for musical setting. Established 1939. Urab. 2181 Bedford Ave., Brooklyn 26, N. Y.

POEMS Wanted Immediately for Musical Setting and Recording. Free Examination. Rush Poems. Songcrafters, Acklen Station. Nashville, Tennessee.

SONGWRITERS—A Publishing House for Amateurs. Free Music-Free Lyric Course. The Amateur Songwriters Association, 1356 Hancock St., Quincy, Massachusetts.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSM, Covina, California.

36 RADIO, TELEVISION, SUPPLIES & EQUIPMENT

WALKIE-Talkies. Hand Sized Citizens Band Two-Way Radios. Anyone May Operate. Several Miles Range. \$49.95. Kit \$34.95. Free Information. Dixon Electronics, 13444 West McNichols, Detroit 35, Michigan.

GOVERNMENT Surplus Snooperscopes, Ham Gear, Mine Detectors, Parabolic Reflectors, Telescopes, Picture Catalog 10c. Meshna Malden 48, Mass.

RADIO & TV Tubes at Manufacturers Prices! 100', Guaranteed! Brand New! No re-brands or pulls! United Radio, Box 1000, Newark, New Jersey.

FULL Transistor radio with airphone \$9.97. Neely's, 16 West 37, Savannah, Georgia.

ELECTRIC Guitars, amplifiers, wholesale. Free catalog. Carvin, PSR, Covina, California.

37 BUSINESS OPPORTUNITIES

IMPORT-Export opportunity, profitable, world-wide, mail-order business from home, without capital, or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger, X697, Los Angeles 24.

\$70 WEEKLY-Home, spare time. Simplified mail bookkeeping. Immediate income-easy! Auditax. 34757D, Los Angeles 34.

11,000 NEW Prospects Daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

YOUR envelopes addressed accurately, reasonably. Fast service. We have capable addressers in your city. Glenway System, Box 6568, Cleveland 1, Ohio.

NEW Home-Import Mail Order Profitunity! Your mailbox stuffed with money! No Selling. No experience. No investment. We supply everything. Free Details. Mail Order Distributors (Import Division), 15201 South Broadway. Los Angeles 61B19, Calif.

YOUR Own Import Mail Order Business! Deal with over 400 manufacturers, exporters of the world. Complete Import procedures, international drop-ship methods. Capital unnecessary. Free details. Associated, Box 2068-P8, Sioux City 4, Iowa.

OPERATE profitable mail order business. Write Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

"50 NEW Home-Business Ideas" Booklet. sample Free. Spray exotic Velvet-Suede on anything. Flokcraft-JY, Los Angeles 61.

FREE Catalog Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U.I. Buyers Digest, 1608 Hillhurst, Dept. PS-1, Los Angeles 27, Calif.

QUICK profits, with no capital! Take orders for magazines your neighbors like, want. Make cash on the spot! We show how with Free kit. Get yours now. Write McGregor Magazine Agency, Dept. 341, Mount Morris, Ill.

EARN Money At Home raising fishworms for us! Backyard, garage, basement. We buy your crop! Inquire: Oakhaven-42, Cedar Hill, Texas.

FIX Typewriters. Free Repair Course. Home operated. Remit 25c for book explaining Free Course and Agency Appointment. Athey, Tarentum, Pa.

GROW Orchids at home. Profitable, fascinating. Successful home grower explains special light, temperature and humidity conditions orchids need. Free-Full details. Orchids, 100 S. Vermont, Los Angeles 4.

BARON Rothschild became wealthy buying stocks "nobody wanted." So can you! Get free Folder PS-5, Forecasts, Box 87, Pelham, N. Y.

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches—sensational new Tenorama. Glamour Girls, Hillbillies; dozens others. All sizes—Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. PX-759, 7530 Greenwood, Chicago 19, Illinois.

BIG Money—Operate own Fix-it Shop. Service household appliances, motors, mowers, saws, skates, etc. Free Book. Christy Trades School, A-8501, 3214 Lawrence, Chicago 25.

PLASTERCRAFT molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Jayhawk Plasters, Blue Rapids, Kansas.

GROW living Miniature Forest (only inches high)—or orchard that bears tasty tiny fruit. Learn amazing Dwarfing secrets! Fascinating hobby! Profitable Homebusiness Opportunity! Free Seeds and Plan. (State your age.) Miniature Nurseries, Dept. JY, Gardena, California.

GAME Warden, Government hunter, Forestry, Park and Wildlife Services announce job openings. All states, Enjoy outdoor work, good pay, real security. Complete information Free! Write Forestry & Wildlife Course, Dept. CC-187, 1038 S. LaBrea, Los Angeles 19, California.

EARN Good Money sharpening chain saws, scissors, cutters, knives. Free Manual. Treyco, North Tonawanda 1, New York.

IF You Like Motorcycles and Money then send for Harley-Davidson Dealership Book on how to become a franchised dealer of motor scooters. Here's a chance to own your own business with a very modest investment. The youth market is beginning to explode and the next few years promise a chance to cash in on it. Write for free illustrated Dealership Book today. Harley-Davidson Motor Company, Dept. PS, Milwaukee 1, Wisconsin.

MARKETS Everywhere. Make Artistic concrete birdbaths, pottery. Best coloring. Home workshop, Hundred varieties. Hollywood Cementeraft, 8527-N Wonderland, Hollywood 46, California.

NATURAL Molding Rubber: Extra Thick. Free Sample. W. Wooley, 1016-B Donald, Peoria, Illinois.

OPPORTUNITY to earn \$15,000-\$30.000 annually. Franchise protected. Granted on \$12,500 basis. Live at home. No merchandise to buy. Selfemployed. One of most exclusive and noncompetitive Businesses in United States and Canada. Send for free explanatory booklet. Harrell and Company, Box 8-D, Louisville, Illinois.

MAKE flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-A Fairview, Hamilton, Ohio.

BEFORE starting any mailorder business read "Mailorder Laws and Regulations" and "Mailorder Rules for Beginners." \$2.00. Licenses, taxes, legal requirements explained. Tasker, Box 3131, Alexandria, Virginia.

\$75.00 FIRST week in your own mail order business. Complete Beginner's Plan. Home operated, spare-full time. Everything supplied. Wayne's Service, 3016-P-1 Channing N.E., Washington 18, D. C.

MAKE New Greaseless Doughnuts In Kitchen. Sell stores. Free recipes. S. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

\$3.00 HOURLY. Typewriter required. Confidential home-setup 35c. Interstate, 37-9 Besch, Albany 9, New York.

COLORGLAZED Concrete pottery made without molds. Patented method. Cemetery products, novelties, tiles. Basement leak-sealing. Money-making projects. Booklet, details free, Men only, National Potteries. Grand Rapids, "Minnesota."

WE Pay \$4.50 lb. dried. Grow Mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We pay \$4.50 lb. Free Book. Mushrooms, Dept. 178, 2954 Admiral Way, Seattle, Washington.

AMAZING Profits making concrete drain tile! Details free. Ceeten Products, Cornella, Georgia.

CASH from Sawdust, Tin-Cans, Newspapers. Over 200 methods. Instructions \$1.00. Charles Company, 42-DPH, Norwood, Ohio.

MAKE Durable building plastic easily. Beautiful — 101 uses — 800% profit. Bays Laboratory, Keams Canyon, Arizona.

VENDING Machines—No Selling. Operate A Route of Coin Machines And Earn Amazing Profits. 32-Page Catalog Free. Parkway Machine Corporation, Dept. 18, 715 Ensor Street, Baltimore 2, Maryland.

\$250.00 WEEK profit possible. Earn at home spare time with fascinating Printing method. \$5 starts you—send no money now. Free Confidential Facts and Valuable Samples. Screen-Print JY, Los Angeles 61.

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior EE, Wisconsin.

FRANCHISES make profits! Have your own prosperous franchise business. Opportunities nationwide for distributors, dealers, agency operators. Write today, National Franchise Reports, Y-528, 333 North Michigan, Chicago 1.

MAIL Order! Succeed with your own Guaranteed Profit mail order business. No inventory. We dropship and show you how to make big profits. Write Giftime, 919 Walnut, Dept. GPS, Philadelphia, Pennsylvania.

EARN \$10,000 Selling Books by Mail. Box 51-BAA, Des Plaines, Illinois.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm, Plains, Georgia.

PREE Report "609 Odd, Successful Businesses." Box 1001-PSD, Evanston, Illinois.

HOW To Operate Your Own Introduction Club By Mail. Easy. Any location. Details Free. Coast, Box 977-A, Glendale 5. Calif.

\$100.00 WEEKLY spare room. Raise redworms soilless way. Odorless. Charlie Morgan, Box 116C, Bushnell, Florida.

NOW'S Time for Profitable Weatherstripping. Write E-Z-On (PS), 1009 Harvard Terr., Evanston, Ill.

FREE Name Brands Catalog! Your own high profit business. Sell Name Brands, full or part time. No inventory—no investment. More than 2000 Name Brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi, stereo radios-phonos., appliances, housewares, hardware, power tools. luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 Floors of Name Brands. Million dollar inventory. Orders shipped complete within 24 hours. Send for Free beautifully illustrated catalog Now! Separate wholesale price list. H. B. Davis Corp., Dept. 14, 145 West 15 St., New York 11, N. Y.

OPERATE profitable mailorder business!! Write: Bond, 1637-R West Vernon, Phoenix, Arizona.

\$5,000, MEN, Women! Work Home! Sparetime! Free "Confidential Plan." Scott, Box 388, Great Neck, New York.

\$70 WEEKLY addressing envelopes, clipping newspapers! Detailed instructions \$1, refundable. Chez Bonnie, Box 290, Great Neck, New York.

\$34.70 TWO Hours. Manufacturing Concrete Products. No Selling. Carlayn Castings. 1803 Fremont, Rapid City, South Dakota.

MOTEL—Resort Management—Qualify for hundreds fascinating, leisurely, wellpaid executive openings. Learn at home. Free booklet. Motel Managers Training School PS79C, 612 S. Serrano, Los Angeles 5.

WANTED, Men, Women, Raise bait for us at home. Full, Spare time. We furnish everything. Sherwood, Dept. L-I, Monmouth, Maine.

OPERATE Local Collection agency. Pays big! Free bulletin. Franklin Credit, Roanoke, Virginia.

IMPORT-Export business made easy. Individual setup service. Not just instructions. Hermes, 152-R West, 42, New York City 36.

MAIL Business Opportunity—We Supply Everything—Fill Orders. Woods, 745-A, Carman, Camden, New Jersey.

\$100.00 WEEKLY With Amazing Catalog plan. No Merchandise selling. Roc. 2317M Marshall, Chicago 23, Illinois.

MAILORDER to motels, restaurants, churches, Institutions. Complete individual setup; not just instructions, Hermes Advertising, 152-G West 42, New York City

EARN \$100.00 Weekly part time from your arm-chair and in one year you'll receive a Free Trip to Europe for two. No selling or mailorder. Pan Pacific, TD4 Box 595, Laguna Beach, California.

DOLLARS from Pennies! It's easy to make and sell costume and sea shell jewelry. Friends, neighbors and shops will buy. Rush address for Free catalog and details. Modern Craft, Box 11068-EB, Saint Petersburg 33, Florida.

GUARANTEED Market. Raise fishworms for us. Free details. Golden Farms, Lubbock 2, Texas. MANUFACTURE beautiful concrete floor tile, spare time. Free details. Century Sales, PS1, 704 North Douglas, Belleville, Illinois.

MAIL Order opportunity magazine 10c. Moritz's Fireside Shopper, Saginaw, Michigan.

PIANO Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Illinois. (Founded 1935.)

AMAD is offering plans for new type advertising business for only \$2.00. Potential \$12,000. Write Amad, Box 2301, Raleigh, North Carolina.

PET Cemeteries Needed everywhere. Start on shoestring. Spare time. Tremendous money maker. Eye opening information \$1.00. Pet Haven Cemetery, Box 1411, Lubbock, Texas.

K-6 INSECTICIDE kills bugs for years! \$3.00 package treats gallon paint! Distributors, agents wanted! Kilpane, 531 Western Union Bldg., Houston 2, Texas.

CANDIED Popcorn and Potato Chip Equipment, Eakins, Box 933-B9, Springfield, Ohio.

\$340.00 MONTHLY with jigsaw. Details. Elkman, 346 North Summit, Sioux Falls, South Dakota.

LIQUID Molding Rubber, Free Sample. Shellcraft Supplies, Chaney's, 1907-C East Road, Jacksonville 11, Fla.

FREE Business. Franchise Protected. Have Own Office. Self-employed. Nationwide Travel Service. Details Free. Pippin And Company, Box 87, Benham, Kentucky.

PROFITABLE Mailorder Business. Everything Furnished, Orders Filled, Vail, 42-G Kensington, Hartford 5, Conn.

PREE Literature! Profitable Mailorder Plans. Hildreth, 1047-C Inner, Schenectady 3, New York.

\$5.00-\$10.00 HOUR Sharpening Lawn Mowers, Tools, Knives, Shears, Drills, E-Z Sharpeners, 3370-N53, Milwaukee 16, Wisc.

LIFETIME income yours! Proved, repeat-sale, home mail order business. Spare or full time. Amazing success record. Free details. Erol Slater, 305 West Eighth, Los Angeles 14, California.

LIQUID Marble—Molded, brushed, sprayed! Particulars free. Marbleizing Service, Edwardsville, Illinois.

MAKE \$46 From Square Foot Plywood; Jigsaw necessary. Free Details. Woodarts, Bridgewater, Mass.

NIPPON American Trade Bulletin tells where to buy transistor, audio electronics, photographic, premium, novelty merchandise, fishing tackle, etc., lowest prices direct from Japan. Only illustrated monthly publication of its kind printed in America. 12 issues, plus bonus 1959 edition "Merchandise Japan Offers", \$6.00. Two trial issues \$1.00. Mail remittance today. Nippon American Trade Bulletin, 1317 Nicollet, Dept. PS, Minneapolis, Minn.

MONEYMAKING OPPORTUNITIES

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th, New York 24.

SELL Titania Gems: far more brilliant than diamonds. Catalog 10c. Diamonite, 2420-S 77th, Oakland 5, California.

MAKE Money Writing Short Paragraphs, Information Free, Barrett, Dept. C-86-D, 7464 No. Clark, Chicago 26.

FIND Money in your mailbox. Start your own Mail Order business. Experience unnecessary. Experts show you how. Write Richton Company, 157B, Maplewood, New Jersey.

EASY to start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-3-H, Chicago 26.

ALUMINUM Awnings, Aluminum Siding. Factory Prices! Sell Neighbors! Write "Dana", Box 10446, Tampa, Florida.

HAMMER? Saw? Drill? \$100 Weekly. Jett. Box 422, Escondido, California.

MONEY Making and Saving Catalogue. Write, Adams Exchange, 210 5th Avenue, New York 10, New York.

MONEYMAKING Vending Machines Catalog. Rakes, 605 Spring Garden, Phila 23, Pennsylvania.

MAIL Order Business. Avoid losing money through errors of judgement. Read, "I was wrong about that," by Arthur Sizemore. Send for free copy. John Bishop, Box 153C, Ojai, California.

AMAZING successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, SP-528, 333 North Michigan, Chicago 1.

FREE Literature — Make Big Money Raising Fishworms and Crickets. Carter Farm-II, Plains, Ga.

MONEYMAKING opportunity, New Unique item. Send \$1.50 for sample, refundable. Mark Manufacturing Co., Gilroy, California.

START Big-Pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-3-H, Chicago 26, Illinois.

BIGGEST Spare Time Profits, showing friends, neighbors beautiful Evans Christmas and All Occasion Cards. Easy to take orders (160% profit) with special kit sent-on-approval. Included Free: 32 samples Personalized Christmas Cards, all new Imprinted Stationery Display, 2 Catalogs, Selling Guide. Write today: New England Art Publishers, North Abington, 752 Mass.

FUN, Possible Fortune! Twenty Acre Mining Claims. \$25.00. Tumco, Box 271, Pittman, Nevada.

REPAIR Hydraulic Jacks—Learn High Paying Trade—Follow Simple Instructions In Illustrated Trouble Shooters Manual Covering All Models \$3.98. Hydraulic Parts Supply, Box 8695, Washington 11, D. C.

\$30-\$60 WEEKLY addressing envelopes for advertisers. Instructions \$1. refundable. Ryco, 210 Fifth Ave., Suite 1102-S, New York 10.

"MAILORDER And The Law" and "Starting a Mailorder Business" know about required Licenses, Federal and State Regulations. Both for only \$1.00. Dorf, 186-K Covington Lane, Woodbury, N. J.

MANY "Big Money" home-profit offers Free! Coulson, Box 81-PM, Omaha 11, Nebr.

MEN — Women! Start Money-Making Plastic Laminating Business at home in spare time. Material that costs 11c brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars Free. Rush name on postcard to Warner. Room CL-3-H, 1512 Jarvis, Chicago 26, Ill.

EARN At Home! Sample, Details 50c. Kadison, 18410 NW 5 Ave., Miami, Florida.

MAKE \$5.000-\$10.000 or more yearly at home, in respectable field. Only 3 hours weekly attention needed. No Experience, canvassing necessary! Exceptional, but true! Few dollars starts you. Just \$1.00 brings complete detailed plan. Satisfaction Guaranteed. Columbia Enterprises Ltd., 9268-PS Piney Branch Road, Silver Spring, Maryland.

MAKE Money, Operating Mail Order Business, Selling Business Cards. Vosacek Printing, 4444PS Ute, San Diego 17, Calif.

MAIL newspaper clippings daily for cash. Ketchum's Advertising, 1058-B, Springfield, Illinois.

MAKE Easy Money Mailing At Home!! Write-Merrill Histand, Box 182-SP, Hatfield, Pa.

POSSIBLE \$100.00 per week selling names and addresses to mail order men. Instructions \$1.00. Ronald Manderscheid, Lansing, Iowa.

MAKE Money Clipping Newspaper Items. Detailed plan. Newscraft, PS-983-E. Main, Columbus 5. Ohio.

CIGARETTES—Make 20 filtertips for 9c. Facts free. Moberly, Box 912, Owensboro, Kentucky.

PROFITABLE Futures! Send \$2.00 for New Guide to Low Risk, Limited-Investment Franchised Businesses. Details free. Pilot Publications, 46 West 33rd Street, New York 1, N. Y.

38A BUY IT WHOLESALE

NEW Multicolor Wholesale Catalog! Housewares, appliances, clothing, silverware, cookware, luggage, binoculars, shavers, radios, phonographs, cameras, projectors, recorders, typewriters, sewing machines, furniture, power tools, toys, sporting goods, watches, diamonds, jewelry, automobiles, etc. Name brands. Huge discounts. Postcard: Selbyco, Decatur 170, Illinois.

LARGEST Wholesale Supply Source in U.S. Get free catalogs. Furniture, clothing, appliances, autos and accessories, farm equipment, tools, housewares, hobby supplies. Free details. Associated Wholesalers, Box 2068-C, Sioux City 4, Iowa.

BUY Wholesale: 100,000 Nationally Advertised Products. Appliances, Cameras, Sporting Goods, Housewares, Watches, Typewriters, Tools, Clothing, etc. Discounts to 80%. Buy-Rite, Box 258, Hawthorne 108, New Jersey.

SAVE Money. Buy wholesale. Watches, jewelry, radios, electrical appliances, cameras. Giant catalog \$1.00. Refundable. Snare Distributing Co., Box 2371-PS, Jacksonville 3, Florida.

ELECTRIC Guitars, amplifiers, wholesale. Free Catalog. Carvin, PSW, Covina, California.

GENERAL merchandise catalog. Honest discounts. 25c handling charge. Farsons. Box 1027, Sunnyvale, Calif.

FREE catalog! Hundreds of bargains. Sparta Specialty Sales, Sparta, Tennessee. 39 FORMULAS, PLANS, ETC.

SAVE! Reclaiming used motor oil. Reuse. Formula \$1.00. Acme. Box 542, Birmingham, Alabama.

LATE Modern Manufacturing Formulas List Free. Chemical Service, Martville, New York.

FORMULAS—All kinds. Latest products. Literature free. Kemico, Park Ridge 15, Ill.

LARGE formula catalog free. Big surprise. Western Chemical, Salem, Oregon. AMAZING new plant food—Usa cheap

AMAZING new plant food—Use cheap ingredients found about the home. Send only \$1.00 for miracle formula. Robertson's, 342 Dresden Drive, San Antonio 1, Texas.

SPECIAL Formulas for latest moneymaking discoveries. New! Good! Profitable! Valuable Literature Free! Miller, Chemist, 1517-N, Tampa, Florida.

40 PLASTICS

LEARN Plastics Fabrication For spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-2, Portland 12, Oregon.

LAMINATING Supplies. Price List Free. Solomson, 46 Cornhill, Boston 8, Mass.

SEND For Complete Catalog From The Plastics Center Of The World. Kaufman Glass Company, Plastics Division PS, Wilmington 99, Delaware.

PLEXIGLAS — Any thickness — Clear — Colors—Cut to size—Clear Rods—Tubing. McClarin Plastics, P.O. Box 168B, Hanover, Pennsylvania.

NOW-Electric Plastic Laminating Kit. Profit. Pleasure, Burr, 330 East Centre, Kalamazoo, Mich.

NEW Do-It-Yourself casting and Molding Plastics! No Experience or Machinery Necessary. Send 25c for Big 64 page catalog. Castacraft Corp., Dept. M-12, P. O. Box 555, Palto Alto, California.

EPOXY Repair Kits—2 for \$1.00 World's strongest chemical adhesive bonds anything to anything! Choice of steel, aluminum, porcelain-filled or clear. Each in handy plastic dispenser! Any 2 for \$1.00. Any 4 for \$1.75. Traffic Control Laboratorles, 460 Union Street, Lynn, Massachusetts.

EVERYTHING In Plastics—Specify Interest Or, Send \$1.00 For Master Catalog. GEL, Box 261, Union, New Jersey.

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterfiles, photos, coins. Send 25c for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. H-102, Woodstock, Illinois.

PLEXIGLAS. Square foot cost, 1/16—\$1.20; ½"—\$1.52; 3/16"—\$1.86; ½"—\$2.21; ½"—\$3.23; ½"—\$4.36. Colors add 10%. Send 15% for postage. Aristocrat Plastics, 23 Sussex Avenue, Newark, N. J.

1 SCIENCE & CHEMISTRY

PORTABLE Physics laboratory complete with all apparatus and manual of 107 experiments, \$49.00. Model Atom Smasher, \$9.95 up, 3-in-1 Electromagnet, \$14.95, Raymaster Cloud Chamber, \$16.00 up, Spinthariscope, \$2.00. Send 25c for literature about these and many other fascinating new scientific products. Atomlab, 3086 Claremont Avenue, Berkeley, California.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 25c. Tracey Laboratories, Evanston, Illinois.

ROCKET Supplies and Chemicals, Catalog and Plans 25c (Refundable), Central Rocket Company, 89S, Waupaca, Wis.

EXPERIMENTERS:—"Bargains Galore Catalog,"—25c (Refundable). Hagenow Laboratories, Manitowoc, Wisconsin.

LABORATORY Chemicals and apparatus: Complete line of chemical sets. Catalog 25c. Atlas Chemical Co., Box 22, Rupert, Idaho.

ROCKET Supplies for amateur rocketry. Catalog 25c. Mervin Hill Company, Boltz, Penns.

NEW 52 page catalog covers everything on chemistry, biology, minerals, Prices slashed 30%. Send 20c. Winn Chemicals, 124P West 23 Street, New York 11.

CHEMICALS, Supplies, Large Catalog, 25c. Laboratory Sales, Box 161-B, Brighton, Mass.

CHEMICALS and apparatus for industrial, analytical and private laboratories. Catalog 25c. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N.Y. BOOKLETS! "Chemistry," "Physics,"
"Astronomy," "Science," "Relativity,"
"Electricity," "Radio," "Light," "Tables,
"Mathematics." 15c Each. Franks, 3121
South Racine, Chicago 8.

42 HELP WANTED REPORTS

COPYRIGHTED Reports. Best paying companies—travel, adventure, promotions. Construction, aviation, shipping, oilfields, laborers, clerical, trades, supervisory, factory, unusual apportunities. Skilled—unskilled. Foreign—stateside. Only \$2.00 (\$2.25 Airmail) (COD's Accepted). Satisfaction guaranteed. Included free: Special reports on Alaska—Venezuela—South America. Research Services, Meramec Building, St. Louis 5PS, Missouri.

AMERICAN Overseas Jobs. High Pay. Men. Women. Transportation Paid. Free Information. Transworld, Dept. 16C, 200 West 34th St., New York 1.

FOREIGN Jobs-Latin America, Alaska, Canada, up to \$1500 monthly. Up-to-date 1959 Foreign Service Directory gives complete information; hot list of firms hiring for Military and Civilian Construction, Aircraft, Oil, Exporters-Importers, Mining, How-When-Where to apply, 11th Successful year, \$1.00. Global Reports, Box 8673-P, Los Angeles 8, California.

JOBS on Ships. Write for free information. World Wide Seamens Service, Box 1445-PS, New York 1, N. Y.

FREE Information — USA Overseas Jobs, High Pay Transportation—Futures, Dept. P, 215 West 34th Street, New York City 1.

JOBS on Steamships, Yachts, traveling foreign countries. Davenport's, 1354-J, GPO, New York 1, New York.

JOBS Overseas! Write Janecek Development Co., 109 Hub Station, New York 55, N. Y.

WANT An Overseas Job?? Information Free. Employment Information Headquarters, 79 Wall Street, Dept. 6-B, New York 5.

JOB Opportunities. Transportation Distant Places. Self-Addressed Stamped Envelope To: Path, Stanley Terrace, Newfield, New Jersey.

NEW YORK Jobs Pay Best! Employment Manual Only \$3 From Haas, Peckham Blvd., Poughkeepsie, New York.

JOB Seekers: reports from U. S. Government on Federal Employment in Alaska and overseas, containing information on skills wanted, where to apply. Also over 600 names and addresses of U. S. firms operating in Spain. France. Germany. England, Japan, Australia, Turkey, Venezueia, many other countries. Also included Free specimen questions and answers from U. S. Civil Service Examinations for Typist, Stenographer, Clerk, Nurse. Postal Service. Stock, Policeman, Engineer, Wildlife. Fishery, over 80 other job titles. Only \$2.00, airmail \$3.00. Satisfaction guaranteed or return for your money back. Guide, Dept. 103. Box 954, Dallas 21, Teves

MONEY, prestige, pleasure—work overseas—\$1.00 brings companies, locations, instructions. Vision, Box 551B, North New Hyde Park, N. Y.

construction workers, business and professionals, others—pertinent B.C. and Alaska information available. Write Opportunity News Service, 385-W Winnipeg. Prince George, B. C.

BOOMING Latin America! Prosperous Brazil. Venezuela—Only hours from the States. New data regarding jobs, opportunities, conditions. American companies employing, etc. All skills required. Salaries to \$1.650.00 monthly—U.S. Tax exempt. Bonuses, living allowances, travel expenses, exciting vacations, and more! First-hand information direct—\$2.00 (\$2.35 Airmail) checks or money orders. Latin American Opportunities, Avenida 16, No. 68-49 Maracaibo, Zulia, Venezuela.

MEN—earn \$60.00 weekly at home. No verbal selling. Tested—proven. Box 8057, Fort Worth, Texas.

43 AGENTS WANTED

YOUR own business—Suits \$1.50; Overcoats 65c; Mackinaws 35c; Shoes 12½c; Ladies' Coats 30c; Dresses 15c; Enormous profits. Catalog Free. Nathan Portnoy Associates, 2109-J Roosevelt Road, Chicago 8.

AGENTS-300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-E West Newport, Chicago.

GOLD or Silver letters, numbers. Windows, Doors, Trucks 1" to 6". 500% Profits—Free Samples. Atlas-U, 544 West 79th, Chicago 20.

EVERY Man A Prospect. Request Free Sales Kit showing line of belt buckles, tie clasps. money clips. cuff links, lapels, individualized with customer's name and emblems, also cap badges for trucking, bus, taxi, police, firemen. Choice 3,000 emblems. Hook-Fast, Box 1425-PS, Providence, Rhode Island.

EARN big commission full or part time. Build profitable business of your own selling America's largest line low priced business printing. 360 page catalog samples hundreds of items used daily by business people. Advertising Specialty line features imprinted ball pens low as \$9.95 for 100. Calendars low as \$5.95 for 100. Free Sales Kit. National Press, Dept. 9, North Chicago, Illinois.

WANTED. Fire extinguisher salesman. Rural areas. Out-O-Matic, 1737M E. 31st, Denver 5, Colorado.

BIG Profits — Stamp Social Security Plates Key Protectors. Sample—50c. Catalog Free. General Products, 188-PS State, Albany 10, N. Y.

START Your Own Business On Credit (U.S. and Canada). Your own boss. 1383 Dealers sold \$5,000 to \$33,500 in 1958. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. G-U-PSC, Freeport, Illinois.

BUSINESS of your own. Earning potential as high as \$40,000 annually. Issued on \$12,500 base. No merchandise to buy. Send for free explanatory booklet. Harrell & Company, Box 8-DD, Louisville, Ill.

SENSATIONAL! Make \$50.00 day. Write for details. National Distributing P.S., 1751 W. Flagler St., Miami 35. Fla.

WILL you wear new suits and topcoats without one penny cost and agree to show them to friends? You can make up to \$30.00 in a day even in spare time. without canvassing. Pioneer Tailoring Co.. Congress & Throop Sts., Dept. T-1226, Chicago 7, Illinois.

MEXICAN art goods! Free Sample! Send 14c stamps mailing. Sylvial, Apartado 9036, Mexico City.

CHRISTMAS Cards—with customer's name imprinted. Broad-appeal personal designs and big-volume business designs—all in one attractive presentation album that actually sells for you! These deluxe cards pay deluxe commissions. Earn \$300 to \$500 (plus Bonuses) easily between now and Christmas, even in spare time. Sales experience unnecessary. Old-established manufacturer. Free Sales Kit includes Sample Album and complete easy-to-follow selling instructions. Send for Kit now and pocket profits next week! Write Process Corp., Dept. 5, 1954 S. Troy, Chicago 23, Ill.

SELL reconditioned spark plugs. Free sample. Lee Plugs, 1608-C Roberts, Houston 3, Texas.

NEW Bathroom Deodorizer. Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee, 63, Akron, Ohio.

SELL Perfumes. Tremendous Profits. Write. Edwardo, 2316-B Brown, Evanston, Illinois.

400' PROFITS! Vitamin Supplements. "\$120 Weekly Plan" Free! Box 7051, New-ark 7, N. J.

\$1.00 FROFIT selling \$2.95 photo enlargement offer. Allen Studio, Reigler Bidg., Little Rock, Arkansas.

MAKE Money seiling sensational Dwarf Trees—bear Giant-Size Apples, Peaches, Pears. Ornamental. Also Stark-Burbank Standard Trees, Roses, Shrubs, Vines, etc. Outfit Free. Stark, Dept. 30170, Louisiana, Missouri.

SELL new 2-Year Light Bulbs to homes, offices, factories. Burns 450% longer than ordinary bulbs or replaced free! "Guaranteed Profit Plan." Details free! Solar Electric Products, 366 Fifth Avenue, Dept. 974, New York.

EARN \$12,600 Yearly—Only two sales daily. World's Best Seller, The Holy Bible. (Illustrated). Protestant or Catholic. Margareta's, P. O. Box 92, Hazleton 6, Pa.

44 HIGH-GRADE SALESMEN

MAKE Extra Money—Big Cash Commissions plus premiums for you and your customers. Sell Advertising Book Matches—sensational new Tenorama, Glamour Girls, Hillbillies; dozens others. All sizes—Quick daily sales; big repeat business. Free Master Kit makes selling easy—no experience necessary. Superior Match, Dept. P-759, 7530 Greenwood, Chicago 19, Illinois.

IF you're interested in making money in selling, see the hundreds of exceptional opportunities in Salesman's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 18, Chicago 10, Illinois.

\$1,000.00 A month for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by airforce snuffs out fires instantly. Only \$4.95. Terrific commissions. Millions want it. Free Kit. Merlite, 114 E. 32nd, Dept. P-66B, New York 16.

MAKE Extra Money selling advertising matchbooks. Free catalog and sales outfit. Matchcorp, Dept. PS-79, Chicago 32.

EARN Big Money selling commercial shelving—parts bins—cabinets—shop equipment. Sold everywhere! Terrific commissions. Free 32 page catalog. Jobber discounts. BFC Corporation, 2807E Hedley, Phila. 37, Pa.

SHINE Shoes Without "Polish." New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee, 34, Akron, Ohio.

YOUR free copy of World's biggest sales magazine tells you how and where to make more money on your own in selling. Write Specialty Salesman Magazine, Desk 6B, 307 North Michigan, Chicago 1.

45 EDUCATIONAL & INSTRUCTION

LEARN While Asleep with your recorder, phonograph or amazing new "Electronic Educator" endless tape recorder. Details free. Research Association, Box 24-NN, Olympia, Washington

BOOKKEEPERS! Increase your earnings! Operate your own simplified "Dollar-A-Week" Bookkeeping and Tax Service. Full or spare time. Details Free. No obligation. Ellis, Box 203, Cedar Grove, North Carolina.

EARN While You Learn Auto and Diesel Mechanics. Master this top paying trade. Many graduates earn \$100 a week and up. Approved for Korean veterans. For free information write Dept. No. 262, Nashville Auto-Diesel College, Nashville 3, Tenn.

MASTER Watchmaking at home. Free sample lesson. Chicago School, 2328-WT Milwaukee, Chicago 47.

"HOW To Train Horses"—A book everyone who likes horses should have. Free. No obligation. Simply address Beery School of Horsemanship, Dept. 587, Pleasant Hill, Ohio.

EARN Degree. Free bulletin. Homestudy only. Midwestern Bible School, 1060 Broadripple, Indianapolis.

USED Correspondence Courses (Bought and Sold) Money Back Guarantee. Gem. Dept. 7-S. Linwood, New Jersey.

HIGH School Diploma at home. Licensed teachers. Approved materials. Southern States Academy, Station E-12, Atlanta, Ga.

ENGINEERING and Art Degrees earned through home study. Electronics, Electrical, Mechanical, Civil, Physics, Business Administration, Liberal Arts. When writing, specify course desired. Pacific International College of Arts & Sciences, primarily a correspondence school. Resident classes also carried. 5719-A Santa Monica Boulevard, Hollywood 38, California.

SELL Slide Rules to college students! Hoffman, 662-S, Passaic, New Jersey.

LEARN Civil and criminal investigation at home. Earn steady, good pay. Institute Applied Science, 1920 Sunnyside, Dept. 33B. Chicago 40, Illinois.

HELP yourself to abundant living. Our courses have alded students to richer, fuller lives. Learn secret of contentment, happiness. Earn degrees PsD, MsD. Write for free book. College of Universal Truth (Correspondence School), 23-K E. Jackson. Chicago.

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses Bought.) Lee Mountain. Pisgah, Alabama.

BE a Real Estate Broker, Study at Home. Write for Free book today, GI approved. Weaver School of Real Estate, 2018R Grand, Kansas City, Mo.

STUDY For Doctor's Degree of Psychology, Metaphysics and Divinity. Correspondence courses only. College of Divine Metaphysics, Dept. P-S. 2811 North Illinois, Indianapolis 8, Ind.

COMPLETE Your High School at home in spare time with 62-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. XB46, Drexel at 58th, Chicago 37, Illinois.

WELDERS earn big money. Easy to learn Arc—Gas—Automatic Welding. Nonprofit school—low tuition. GI approved. Free booklet. Hobart Welding School, Box P-792, Troy, Ohio.

FINISH High School at home, spare time. No classes. Diploma awarded. Write for Free catalog. Wayne School. Catalog HBA-84, 2527 Sheffield, Chicago 14.

ABSOLUTE Christ Science Booklet, preparation—"Order of the Meek" \$1.00. C. E. Smith, Box #36, Buena Park, Calif.

MEN-Learn Electronics—no experience or higher education necessary, train as Electronic Technicians And Specialists. The need for trained men is great in all fields... manufacturing, communications, broadcasting, radar, your own service shop and many others. Start training now. Nation-wide placement help, easy budget terms, valuable kits furnished. Write: Dept. C-2, Electronics Division, Northwest Schools, 1221 N.W. 21st, Portland, Oregon.

LEARN Television servicing, simplified. Previous training not necessary—4—lessons \$1.00. Scientific and Technical Studies, P. O. Box 4016, Brighton Station, Rochester 10, New York.

FREE I.Q. Test and information. Know your abilities. Capitalize on your own superior talents. Write Associated Institute, Box 4. Manhattan Beach 2, California.

PHYSICAL Therapy and Massage. Home Training. Practice privately or work with doctors and hospitals. Free Catalogue. National Institute, Box 4, 159 E. Ontario, Chicago, Illinois.

USED Correspondence Courses. Educational Books. Satisfaction Guaranteed. Catalog 10c Refundable. (Courses Bought.) Bayles, 78-D Courtright, Wilkes-Barre, Pa.

CALCULUS, Powerful Space-Age Mathematics, Easy Practical Lessons, First Four \$1. Matheo, 4256-10 Minmor, Cincinnati 17, Ohio.

OPERATE Your Own Insurance Brokerage. Details. T. D., 187 Austin, Old Bridge, N. J.

USED Books, Courses, List: Hutchison Service, 4167 Hemphill, Fort Worth 15, Texas.

ELECTRO-Mechanical Engineering—Correspondence. Midwest Engineering School, 10923 Hillcrest, Hickman Mills, Missouri.

BECOME Real Estate Broker Fast-Unlimited opportunities-Economical Homestudy Course. Particulars FREE. Gordon-Howard Institute, 322 Glover Building, Kansas City 5, Missouri.

BECOME Tax Consultant. Graduates earn \$1,000-\$3,000 every tax season preparing returns evenings. State approved. Union Institute, Lakewood 1A, N. J.

WANT a Diesel Job? Higher pay? Advancement? We can help you qualify! Complete Diesel, Tractor and Heavy Equipment and Cummins Diesel Engine Shop-method home-training courses available. Write today, Interstate Training Service, Dept. B-2, Portland 12, Ore.

EARN Degree through correspondence courses or tests. Colleges abroad. Aurep. Central Valley, New York.

46 CONTESTS

WIN contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25c. General Contests, 1609-A East 5th, Duluth 12, Minnesota.

PRIZE Contests! Fabulous Home Income Opportunity! How and Where to Win Your Share! Latest Contest Books! Send Stamp! National Contest Bulletin, Box 2685-PS. Miami 1, Florida.

47 DETECTIVES

DETECTIVES—Work home—Travel. Experience unnecessary. Detective Particulars free. Write Wagoner, P-125 West 86th. New York 24.

DETECTIVE Training. Phillips Secret Service System, 1917-C North Kenneth, Chicago 39, Ill.

48 LANGUAGE OUTFITS

LEARN world interlanguage endorsed by Unesco. Free lesson. Esperanto Now, Middleton, Wisconsin.

"ESPERANTO For Americans" recommended textbook \$3.95. Esperanto Institute, Box 1285, Milwaukee 1, Wisconsin.

50 BUSINESS SERVICE INFORMATION, NAME LISTS

BUSINESS Worries? Job Problems? Consult Expert. Dr. Haas, Peckham Ave., Poughkeepsie, New York.

SPECIAL SERVICES

ENGINEERED Solutions, Problems Solved, Circuits Designed Consulting, Box 55403, Indianapolis 5, Indiana.

AUTHORS SERVICE

WANT Your Book Published? Learn how we publish, advertise, promote, distribute. Many successes. Free booklet PS. Vantage, 120 West 31, New York.

IF your book manuscript has sales possibilities, our cooperative contract offers you high royalties and national distribution. All subjects considered. Free brochure "Publish or Perish." Send book MS to Clayton Press (Att: Mr. Gibb), 507 Fifth Avenue. New York 17.

WRITERS: Book Manuscripts invited for publication on our cooperative plan. Greenwich Book Publishers. (Atten. Mr. Ibsen), 489 Fifth Avenue, New York 17, New York.

54 CARTOONING, SIGN PAINTING, CHALK TALKS

PAINT Signs-Master die cut, outline letter patterns. Complete assortment. 115° to 12" high, prepaid \$2.00. Eyerly, P-583, Newton, Iowa.

COURSE in high-paying commercial art. \$5. Donald Hartung, Box 43, Easton, Pa.

LEARN Showcard Writing—Sign Painting In Three Hours. Big Paying Profession. Unlimited Field, Interesting Brochure Free. Sherwood. 200-PS, Summer, Boston 10, Massachusetts.

YOU can Entertain with Chalk Talks. Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.

"HOW To Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is free; no obligation. Simply address: Cartoonists' Exchange, Dept. 197, Pleasant Hill, Ohio.

55 TYPEWRITERS & OFFICE MACHINES

56

I.B.M. Electric Typewriters \$49.95. Continental Distributors, Box 71, Temple City, California.

RUBBER STAMPS & OFFICE SUPPLIES

THREE line, self-inking pocket rubber stamp; plastic case \$1, metal case \$1.80. L. Watson, P. O. Box 162, St. Charles, Illinois.

INDEXED Cushloned 3 lines \$1.00, 4 or 5 lines \$1.50. (Script, Print or Old English) Free stock stamp circulars 1 day Service. Youngers Stamp Shop, Princeton, Iowa.

FREE—Rubber Stamp Catalog. Martins, 1425 Major Drive, Jefferson City, Missouri.

STAMP Free, with 100 letterheads and 100 large envelopes at \$5.00. ASP, 619 Atlantic, Long Beach 12, California.

57 PRINTING, MULTIGRAPHING, ETC.

FREE Catalog Postpaid printing, Rubber stamps. D M Press, Sebastopol, Calif.

OFFSET Printing: 1,000 8½x11—\$5.50;
5M—\$17.00. Fast! Art, Varityping, Promotion, 385-P7 Broadway, New York City 13.

1,000 BUSINESS Cards, "Raised Letters" \$3.95. Samples. Pioneer, PS-7 Island Park, New York.

EXCELLENT Printing, Reasonable, Samples, Mondello Press, Sycamore St., Belmont 79, Mass.

OFFSET Printing—24 Hour Service— \$6.75—1000 812x11; \$18.50—5000. National Letter, 300 West 43rd St., New York City 36.

100 634 ENVELOPES, 100 512x812 Letterheads printed. \$2.35. M. Fortney, R3-V, Dillsburg, Pa.

LETTERHEADS, Circulars, etc. Price list. Valaitis, 1705 South 2nd, Phila. 10, Pa.

BUSINESS Cards—1000—\$2.95. Other printing, rubber stamps lowest prices on market. Hatfield 87, Berryville, Arkansas.

50 DECALS. Name, Address, \$1. Eddy, 7 Greenacres, West Hartford 7. Conn.

100 EACH 8½x11 letterheads, 6¾ envelopes carefully printed. \$2.00 Postpaid. Race Printing, Hudson, New York.

1,000 EMBOSSED Business Cards \$3.50 Postpaid, Samples. Ellis, 5909 Highlandview, Sylvania, Ohio.

1.000 BUSINESS Cards \$2.50 Postpaid. 2-Colors \$3.99. Skilprinters, Marianna, Florida.

BUSINESS Cards With Glamour, Reasonable, Samples, Mention Business, Heavene , Colmar, Pennsylvania.

1000 PERSONALIZED name & address labels in plastic case \$1.00. 100 Personalized correspondence post cards with your name and address printed \$1.00. Youngers, Princeton, Iowa.

DISTINCTIVE. Low-Cost Business Printing. Catalog, Samples Free. Biggerstaff Printing, Box 1351, Chapel Hill, N. C.

8 PRINTING OUTFITS, SUPPLIES

DO your own printing. Save money. Simple rules. We supply everything. Print for others; good profit. Raised printing like engraving too. Have home shop. Details free. Kelsey Presses, V-8, Meriden, Conn.

PRINTING Presses, Type, Supplies, Lists, 4c. Turnbaugh Service, Mechanicsburg, Pa.

PRINT, exchange hobby papers. American Amateur Press Association, 822 South Orleans, Tampa 6, Florida.

RUBBER Stamp Presses, Hydraulic Operated. Electrically heated. Sizes 5"x8", 8x12", 10x15", starting outfits, supplies. Printing Presses, supplies. Custom Manufacturing, 507 N. Jefferson, Springfield 2, Missouri.

MAKE Your Own self-molding rubber stamps and printing cuts. Plexirubber, Argyle 2, Wisconsin.

59 PATENT ATTORNEYS

INVENTORS: Learn how to protect your invention. Unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and prepared to serve you in handling your patent matters. "Patent Guide for the Inventor" containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request—without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 92B-G District National Building, Washington, D. C.

INVENTORS: Without obligation, write for information explaining the steps you should take to secure a Patent. John Randolph, Registered Patent Attorney, 807 Victor Bldg., Washington 1, D. C.

INVENTION Record form free and "Patent Information Every Inventor Should Have." Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

INVENTORS: Patent Information will be sent on request, C. A. Snow & Company, Registered Patent Attorneys, S 427 Snow Building, Washington 1, D. C.

"INVENTOR'S Guide" and "Record of Invention" free on request. Frank B. Ledermann, 154 Nassau Street, New York City.

INVENTORS — Take these preliminary steps toward patent protection. Sketch and describe your invention. Sign, date and have this disclosure witnessed by two people who understand your invention. Have us make a preliminary search among U.S. patents already granted for similar types of invention. We report on the probable patentability of your invention and recommend your further course of action. Write for our instructive bookiet, "Patent Protection for Inventors" and Convenient evidence of Invention disclosure form. Victor J. Evans & Co., 541-H Merlin Building, Washington 6, D. C.

INVENTORS—If you believe you have an invention, we can make a preliminary search on your invention and advise you whether we think it can be patented. Send for copy of our Patent Booklet "How to Protect Your Invention" and "Invention Record" form. No obligation. McMorrow. Berman & Davidson, Registered Patent Attorneys, 143-F Victor Building, Washington 1, D. C.

FOR INVENTORS

INVENTORS, if you have an invention for sale, patented or unpatented, write Institute of American Inventors, Dept. 30A, 635-P St., N.W., Washington 4, D. C.

INVENTION Record form free and "Patent Information Every Inventor Should Have." Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

INVENTORS: Without obligation, write for information explaining the steps you should take to secure a Patent on your invention. John Randolph, Registered Patent Attorney, 806 Victor Bldg., Washington 1, D. C.

INVENTORS—Send for free Patent Information book and Inventor's Record. Registered Patent Attorney, Associate Examiner, Patent Office 1922-1929; Patent Attorney & Advisor, Navy Department 1930-1947. Gustave Miller, 79-PSI Warner Building, Washington 4, D. C.

INVENTORS Don't sell your invention Patented or Unpatented until you receive our offer, write Cowgill, Box 298, Marion, Ohio.

INVENTORS! Have you good patentable ideas? Write Mr. Metzler, 130 West 42nd, New York.

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Inventions on Demand, 79 Wall Street. New York 5, N. Y.

WE have the markets if you have the ideas. Harvey Engineering, Cambridge 1, Maryland.

"INVENTOR'S Guide" sent free, Frank B. Ledermann, 154 Nassau Street, New York 38, N. Y.

PATENT Searches \$6.00. 48-hour service. Free Invention Protection forms. Write Raymond L. Smith, Patent Searcher, 620 Sheraton Building, Washington 5, D. C.

PATENT Searches including copies of nearest patents. \$6.00. Reports airmailed within 48 hours. More than 100 registered patent attorneys use my service. For Free invention protection forms. Write Miss Ann Hastings, P. O. Box 176, Washington 4 D. C.

PATENT Searches \$6.00. 48-hour airmail service. Invention Protection forms free. Write Patent Engineering Service. 711 14th Street N.W., Washington 5, D.C.

FREE-"Vital Information Every Inventor Needs Before Selling Invention." Brown, Box 349, New York 8, N. Y.

INVENTORS: Learn how to protect your invention. "Patent Guide" containing detailed information concerning patent protection and procedure together with "Record of Invention" form will be forwarded upon request—without obligation. We are registered to practice before the U.S. Patent Office and prepared to serve you in handling your patent matters. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 92A-G District National Building, Washington, D. C.

INVENTORS—This firm is registered to practice before the United States Patent Office and available to assist you in the preparation and prosecution of your patent application. "Patent Protection for Inventors" booklet containing detailed information and steps to take toward patent protection sent promptly upon request. No obligation. Victor J. Evans & Co., 542-H Merkin Building, Washington 6, D. C.

PATENT Drawings Your Inventions Made By Experts. Patent Service Associates, Haverhill, New Hampshire.

CASH for Your Idea. List Free. Inventors Sales and Engineering Bureau, Dept. 279-E, Box 4973, Washington, D. C.

INVENTORS—If you believe you have an invention, we can make a preliminary search on your invention and advise you whether we think it can be patented. Send for copy of our Patent Booklet "How to Protect Your Invention" and "Invention Record" form. No obligation, McMorrow, Berman & Davidson, Registered Patent Attorneys, 143-E Victor Building, Washington 1, D. C.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 30-B Wall Street, Financial District, New York City.

61 INVENTIONS WANTED

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information free. Institute of American Inventors, Dept. 30C, 635-F Street, N. W., Washington 4, D. C.

INVENTIONS wanted. Patented; unpatented. Tremendous Manufacturers lists. Global Marketing Service, 2420 77th, Oakland 5, Calif.

INVENTORS Don't sell your invention Patented or Unpatented until you receive our offer, write Cowgill, Box 298, Marion, Ohio.

INVENTIONS needed immediately for manufacturers. For additional information write Kessler Corporation, 77-IW, Fremont. Ohio.

ARE you interested in offers from reliable manufacturers for your invention? Patented, unpatented. Harvey Engineering, Cambridge, Maryland.

INVENTORS! Consider our offer first before selling or licensing your invention on a cash or royalty basis. Patented. Unpatented. Inventions on Demand, 79 Wall Street, New York 5, N. Y.

INVENTIONS Wanted: "Patented"—
"Patent Pending." 28 Years experience
Promoting Inventions. National Service
Bureau, 3122 Meramec, St. Louis 18,
Missouri.

FREE-"Vital Information Every Inventor Needs Before Seiling Invention." INVENTORS—Get The Best Offer First! Patented or unpatented. Write Carl Sommer, Director, Industrial Invention Sales, 3136-B Sylvania Ave., Toledo 13, Ohio.

INVENTIONS wanted now by my Manufacturer Clients. Patented. Unpatented. Write Gilbert Adams, Patent Broker, 80-R Wall Street, Financial District, New York City.

HOUSEWARES Inventions Wanted: Submit description or Patent copy. PRC, Box 181, Arlington, Virginia.

DEAL direct with a manufacturer who can produce your product. Fox Specialty Co., Lowell, Mass.

FREE List Needed Inventions. Protection Form. Inventors Sales & Engineering Bureau, Dept. 179-E, Box 4973, Washington, D. C.

SUPERIOR promotions. Patented, unpatented inventions. Information booklet, free. Superior, 338-342 North Rodeo, Beverly Hills, California.

62 PATENTS FOR SALE

MAKE offer—Patent On Automatic ignition control switch. Paul Vesco, Box 1, Winnemucca, Nev.

63 MANUFACTURING

HOME Manufacture Foam Plastics. Details. Foam Products, Box 427, Warner Robins, Georgia.

MANUFACTURER Fishing Lures. Plastic, none better. 20 Models, Pennies. Free circular. Quaker, 3514-24 N. Lawrence, Phila 40 Pa

64 MODELS, MODEL SUPPLIES

"POWER Drives Handbook"—36 pages illustrating many types motor drives for model autos, boats, displays, turntables, etc. Mail 25 cents cash, returnable first order \$3.00 or more. Wilson's of Cleveland, Dept. PS, 425 Lakeside N.W., Cleveland 13, Ohio.

SHIP Models. Most complete line in New England. Kits. fittings, plans, books, tools, engines, motors. Illustrated catalog 35c. James Bliss and Co., Inc., Dept. PS, 342 Atlantic Avenue, Boston 10, Massachusetts.

SHIP and yacht model fittings; blueprints. Send 35c for Illustrated catalog =29 listing hundreds of items. A. J. Fisher, 1002-2 Etowah Ave., Royal Oak, Michigan.

SCALE model materials for building model homes and architectural buildings of any type. 4" and 4" scale. Send 25c for catalog. A&B Model Builders, Dept. S, 454 Donovan Road, Kansas City, Kansas.

"ST" Steam Engine Castings, Fittings Catalog 15c. Ship Models Ltd., 186 Summer, Andover, Mass.

SHIP Model Kits And Fittings: Clippers, Schooners, Frigates, Brigs, Plaque Models, Plans. Catalog And Book List 25c. Model Shipways, Box 85, Bogota, New Jersey.

LIQUID Rocket 75 lb. thrust 5' long. Complete plans \$2.00. Missile Research, Station 1. Provo, Utah.

POWER Models. Unusual steam, gasoline and traction engines, fittings, metals. "4-Wheel Switcher" Locomotive. Comprehensive. 92 page catalog \$1.00. Charles Cole, Ventura, Calif.

HOME CRAFTSMAN

FREE Leathercraft Catalog. Quality Kits, Leathers, Tools, Handicrafters, Dept. S. Box 427, Montrose, California.

FREE "Do-It-Yourself" Leathercraft Catalog. Tandy Leather Company, Box 791, N30, Fort Worth, Texas.

LEARN Art Metalcraft and jewelry making. Complete, inexpensive, home training course now available. Special tools and materials furnished. Write for free booklet. Interstate Training Service, Dept. L-2. Portland 12, Oregon.

PAINT Sprayer. 7 times faster than brushing. Sensational offer! \$39.50. Free Folder. Imsco, 1829 S. State, Chicago 16, Illinois.

!!FREE!! Leathercraft catalog. Hundreds of new items. Write MacPherson Bros. Leather Company, Dept. A, 730 Mission St., San Francisco 3, Calif.

FREE Fluorescent Lighting Bargain Catalog—Easily assembled kits; repair parts; fixtures. Shoplite, 650S Franklin, Nutley 10, New Jersey.

WOODWORKING and Cabinetmaking course for beginning and advanced home craftsmen. Only complete low-cost home training program available. Write for free booklet. Interstate Training Service, Dept. G-2, Portland 12, Oregon.

CYPRESS Knees-For Lamps, arrangements, gifts. 10-16"-six assorted \$5.75, postpaid, guaranteed. Gipple's, DeLeon

SQUAREKNOTTERS: Make belts, handbags, lanyards, dog leashes, etc. Special offer! Beginner's book, catalog and quality cord samples 25c. P. C. Herwig Co., Dept. 71-P7, 39 Henry St., Brooklyn 1, New York.

FREE. New Catalog 2430 artist-drawn patterns. Craftplans, 1322-B Wabash, Chicago 5.

SHELLCRAFT Supplies. Lowest prices! Large illustrated Catalogue 25c. Paces's, Box 279, Bradenton, Florida.

KNOCKDOWN cedar chest and lumber, free price list. Bedford Lumber Company, Shelbyville, Tennessee,

66 DO IT YOURSELF

AIR Conditioners, Home, Automobile. See Kool Engineering ad. Page 205.

HOT Water Instantly Every Faucet. Complete, Easy Instructions \$1.00. Ammann, Argonia, Kansas.

CABINS, Construction Plans, \$1.00, 4-\$3. Sportsman, Beachcomber, Weekender, Hideaway. Do-Wil, 2933 Veazey, Cincinnati 38. Ohio.

ELECTRIC Car Plans \$1.00. Magnuson Co., Box 15003, San Diego 15, California.

OLD GOLD, JEWELRY, WATCHES, ETC.

USED and new watches \$2 up. Free List. Southern Watches, 5-PS So. Wabash, Chicago 3.

HIGHEST Cash For Old Gold. Breken Jewelry, Gold Teeth, Watches, Diamonds, Silverware, Spectacles, Platinum, Mercury. Free information. Rose Refiners, Heyworth Bldg., Chicago 2.

HIGHEST Cash immediately, Old Gold Teeth, Bridges, Jewelry, rings, Watches, Diamonds, Platinum, Free Information, Rockey Refiners, 4016B Hawthorne, Palos Verdes Estates, California.

10 SWISS Watches \$18.00. Catalog 25c. Berkowitz, 1150 Castlehill, New York City 62.

GOLD, Silver, Platinum—watches, spectacles, jewelry and teeth. No Obligation to Sell. Send Scrap for Best Price. Electro Company, 1942 Highland Ave., Buffalo 28, New York.

FREE catalog. Costume jewelry parts. Supplies. Reasonable prices. Fast service. Guaranteed quality. Unique merchandise. Folsom's, Box 52, Medford 55, Massachusetts.

GOLD, silver, platinum, jewelry, watches, spectacles, teeth, rings, coins wanted. Highest cash immediately, information free. Wilmot's, 1067B Bridge, Grand Rapids 4, Michigan.

TOBACCO & PIPES

CIGARS from Growers Finest Conn. Valley Tobacco. Write for Free Sample Offer. Satisfaction Guaranteed. Hudson, Westfield, Mass.

FOR THE HOME

FOAM rubber furniture cushions—Factory seconds 50% discount. Free catalog. Perma-Foam, 390-A Nye Ave., Irvington, New Jersey.

BURGLAR Alarm, no electricity, locks partially raised windows. Allied Associates, Box 48, Dexter, Maine.

AWNINGS: indestructible Vinyl or Aluminum: Wholesale. National distribution. Free style coaching. Ken McIntire, Falls Creek, Penna.

CESSPOOLS, septic tanks, all clogged drains cleaned, deodorized by new enzyme product. Saves annual pumping, digging, etc. Harmless to plumbing, pets or people. Simply flush through tollet. Six months' supply only \$2.95. Mailed anywhere in U.S.A. Electric Sewer Cleaning Co., Allston 34, Mass.

70 OF INTEREST TO WOMEN

MAKE \$25 to \$35 weekly addressing envelopes. Our instructions reveal how. Glenway, Box 6568, Cleveland 1, Ohio.

DRESSES 24c; Shoes 39c; Men's suits \$4.95, trousers \$1.20. Better used clothing. Free Catalog. Transworld, 164-T Christopher, Brooklyn 12, N. Y.

WAREHOUSE Clearance Sale. Catalog 10c. Donald Hartung, Box 43, Easton, Pennsylvania.

HOUSEWIVES Wanted! Big money. Spare or full time cake decorating and candy making. Turn your kitchen into a gold mine. Learn and earn at home. Write for free facts: Candy And Cake, Dept. 461, Fallbrook, California.

INTERESTING mail from all over the world samples catalogs, brochures one dollar puts you on our list permanently. Send to Florida Mailers, Dept. M-L, Box 1189, Coral Gables, Florida.

HOUSEWIVES -- earn \$60 weekly great material home. No selling. Dignified work. Oppor-

\$1.000-\$5,000. YEARLY Possible, from choice of 72 home moneymaking opportunities! Free Information! Mann. C-427, Woodcliff Lake, N. J.

\$200. MONTHLY Possible, Sewing Babywear! No house selling. Free Information. Send name to Cuties, Warsaw 14, Indiana.

71 FOR SALE MISCELLANEOUS

VITAMINS-\$5.00 Delivers three month supply of strongest formula others sell for \$9.45. Moderne, 905A Normandy, Mismi Beach, Florida.

DIRECT From Scotland. Special Offer of Handwoven Harris Tweeds, made in the Scottish crofters own homes, at less than half price-10/-per yard (only \$1.40). Each length has been dried over a peat fire to preserve the famous Harris odour. Write air mail for free patterns. Special Sale Offer of all wool full size Tartan Sale Offer of all wool full size Tartan Rugs, in Royal Stewart, Hamilton, Robertson, Fraser, and Wallace (reds), Black Watch and Macdonald (blue/greens), Buchanan (yellow), Dress Stewart (white/red), and Macphersons (browns). For travel, caravan, or bedcovers. Reduced to \$6.65 each. Were \$9.52 each. Ladies' Fair Isle Yoke Lumber Jackets or Golfers in fawns and grey backgrounds with lovely traditional designs. sizes 32" to 42" bust, price \$7.35 each. Special sizes or designs made to order. Harris Wool or designs made to order. Harris Wool Socks, all wool, vegetable dyes, sizes 7" to 12" foot length, \$3.15 for three pairs. Heavy sleeved Harris Wool and Norwegian pullovers or sweaters, suitable for fishermen, hunters, lumber jacks, drivers, me-chanics, sizes 34" to 48" chest, price \$12.25 Oiled wool, semi-waterproof and wear for years. Remit by personal cheque, dollar drafts, American Express postal orders; add I dollar for postage and insurance on orders of up to 5 dollars. 2 dollars up to 20 dollars. Money back guarantee Price little of Harristone back guarantee bac antee. Price list of Harris tweeds, tartans, sweaters, kilts and children's wear free on request. Hebridean Crofter Weavers Ltd., Dept. P.S., Muir of Aird, Benbecula, Outer Hebrides, Scotland.

ROCKET-Roll—A wonderful toy. Worlds of fun for children from 3 to 13. \$1.25 PPD. Rocket-Roll Co., 325 East 55th, Kansas City, Mo.

72 WANTED TO BUY

QUICKSILVER, platinum, silver, gold. Ores analyzed. Mercury Terminal, Norwood, Massachusetts.

3 WEARING APPAREL

HANDMADE Western Boots. Free Catalog. Hall Boots, Box 246, Ysleta, Texas.

74 RAZOR BLADES, SHAVERS

IMAGINE—A Machine To Resharpen used double-edge razor blades. Guaranteed. Send \$5.00. Or \$2.00 Deposit, Balance \$3.95 C.O.D. Miller Company, Box 66, Youngstown 1, Ohio.

5 TATTOOING SUPPLIES

LEARN profitable, fascinating Tattooing. Illustrated Information \$1.00. Zeis, 728-B Leslie, Rockford, Illinois.

77 GEIGER COUNTERS & TREASURE FINDERS

TREASURE! Exciting Handbook 25c. Locators. Howe, 811 Kansas, Atchison, Kansas.

TRANSISTOR Treasure Detectors, underwater detectors. Many models. Free catalog. Gardiner Electronics Co., Dept. 1. 2545 East Indian School, Phoenix. Arizona.

MONEY for you in buried treasure—coins, gold, silver . . . can be found with Goldak Transistorized Locators. Five models including Underwater Locator priced from \$79.50. Free literature . . Authentic books of known treasures available. Goldak Company, 1540 West Glenoaks Blvd., Glendale 1, California.

METAL Locator Kits and Assembled Models from \$39.90. Transistorized and Underwater Models Available. Free Catalog. Electronic Applications, Dept. S, Box 8, Arlington 10, Virginia.

LITHIUM-The Wonder Metal. Free Booklet Describes Prospecting Information. Uses, Etc. Nu-Age, Box 142, North Battleford, Sask, Canada.

UNDISCOVERED Wealth! Transistorized M-Scope detects gold, silver, jewelry, etc. Lightweight, guaranteed. From \$59.50. Easy Terms. Free Catalog. Fisher Research. Dept. C-2, Palo Alto, Calif.

TREASURE catalog 25c, free with "El Dorado" 190 Lost Treasures \$1.25, or "Pan Gold For Profit" \$1.00. Anchor Archives. Rye 1, N. Y.

8 WATCH REPAIRING

WATCH and clock repairing books. Free catalog. North American, 2320-BG Milwaukee, Chicago 47, Illinois.

WATCHMAKERS Journal contains instructions in watch repairing. Sample copy 26c. Dean Co., Box 3218-S, Daytona Beach, Florida.

9 MISCELLANEOUS

PRODUCTIVE Mailing Lists on labels. Many Categories! D. Dickman Company, Willow Springs, Missouri.

ELECTRONIC Sleep Inducer. Completely harmless. Free literature. Gardiner Electronics Co., Dept. 26, 2545 East Indian School, Phoenix, Arizona.

MANUFACTURING Bow-Ties at home earns Extra Cash. 500% Profit wholesaling, retailing. \$5.00 brings you complete kit, patterns, material, instructions—Tieclips, Mounting Cards. JV Neckwear, 210 Fifth Ave., New York 10, N. Y.

BOOKS to help you win-at races, poker, craps-most any game. Catalog free, Turf Book Shop, 2073-2, Inglewood, California.

RECHARGEABLE flashlights \$3.95, Black -Forest clock kits \$3.95, Gaiser, 1105 W. Mulberry St., Kokomo, Indiana.

ARE you Moody-Blue? Send \$1.00 To: Blue Boy. Box 78, Tremont Sta., N. Y.

232 PAGE Catalog \$2.00. Laboratory Materials, 7319 Vincennes, Chicago, Illinois.

SNOW Cone Machines. All Prices And Sizes. Special For Grocery Stores. Box 7803, Dallas, Texas.

GENUINE four leaf clovers 35c each postpaid. Allen Hawley, Red Top, Missouri.

CONCENTRATED Powder Guaranteed To Clean Without Rubbing Brass, Silver. Gold, Copper Like New. \$1.00 Postpaid. Robert Lundahl, 1203-20th Avenue, Rockford, Illinois.

RECEIVE—Magazine Samples. Mails. Catalogues, Bargains From Everywhere. Get Listed 25c. Rorick's, Cincinnati 26, Ohio.

MATERIALS for Large Modern Picture. \$1.00. Adell's, Box 182, Westminster, California.

GAMMA-ray pictures of Flowers, Exquisite photographic reproductions suitable for framing. First public sale offer. \$1.00. Box 2505, Bell Gardens, California.

NEW!!!!! Big 6"x7"x9" Safe Vault. Features Burglar Alarm, Combination Lock, Cash Drawer, Shelf. Ideal for cash, papers, etc. Only \$4.95 Postpaid. Other Items—Free Folder. Mailtime Sales Co., 126-P Vanderbilt Ave., Brooklyn 5, N. Y.

79A WESTERN MERCHANDISE

WELLS-Fargo Reward Posters 12/\$2 Jesse James 50c. Pioneer, Decatur, Ga.

80 PERSONAL

MEXICAN Legal Matters. A. Espejo, Box 234, Hermosillo, Sonora, Mexico.

BORROW \$50 to \$600 By Mail. Quick, Easy. Private. No Co-Signers. Repay in 24 small monthly payments. For the amount you want write today to Dial Finance Co., 410 Kilpatrick Bldg., Dept. G-1, Omaha 2, Nebra.

REMAILS 25c; Forwarding \$3.00 month. Eddie, Box 84, Detroit 23, Michigan.

KNOW the real truth about mind, sickness, personality. Backed by \$25,000 signed guarantee! 20th Century Publications, 2354-A Topanga Canyon Blvd., Topanga, California.

WASHINGTON, D. C. mailing address. Monthly \$4.00. Letters remailed 25c Warden of Capitol Hill, Suite 318, 740 15th Street, N.W., Washington 5, D. C.

REMAILS, 25c, Monthly \$3.00. Roberts, Box 1906, Chattanooga 7, Tennessee.

MEXICAN Law. Attorney Ceniceros, Apt. 79-Cd. Juárez, Chih., Mexico.

"RULE Others with your Thoughts."
Telepathy. (Details —— stamp.) Clarion,
846-S6 Sunnyside, Chicago 40.

LOANS By Mail. \$50 to \$500 for any purpose. 2 years to repay. Employed men and women eligible. American Loan Plan, City National Bldg., Dept. PS-79, Omaha 2. Nebraska.

MAIL Received, Forwarded, 25c letter. \$3.00 month, Lloyd Moffitt, 2911 N. Flagler, West Palm Beach, Florida.

CULTS, Sects, Philosophical groups in Southern California. Twenty-six groups summarized to origin, beliefs, publications, locations. Request publication S-1. Only \$2.00 cash, check, money order. Arrow Research Institute, Box 25583, Los Angeles 25. Calif.

INSECTOCUTOR Eliminates Pests. Free Literature. Par-Kee Company, 6518 Honore. Chicago 36, Illinois.

FLORIDA Remails 25c, Monthly \$3.00. Al Gatlin, Box 7214, Jacksonville 10, Florida.

MONOGRAMMED stationery, 100 folding sheets, envelopes only \$2.95. State initials wanted. Ral-fre, Box 1151, Buffalo 11, N. Y.

SECRET Mail Receiving-Forwarding System. Hedgpeth, Box 830, Alhambra 24, California.

REMAILS: From Famous "Palm Springs" 25c letter. Box 95, No. Palm Springs, California.

"ART And Human Genetics". How To Choose The Right Mate For You. Paper Cover 50c, Coin or Stamps To Corydon Snyder, 520 North Paulina, Chicago 22, Illinois.

REMAILS, N.Y. City, 25c. Pollins, 2020 Seagirt, Far Rockaway, New York.

MEXICO City, Remails, 30c. Moraleswood, 136 Chapultepec, Apartment 5, Mexico, D. F.

LETTERS remailed from "The Water Wonderland" 25c, monthly \$3.00. Davellas, Spring Arbor 8, Michigan.

For do-it-yourself work in which you'll revel

Do-it-yourself with the new split-level

See August POPULAR SCIENCE for your next clue.

NOW-RUN YOUR OUTBOARD 2-CYCLE ENGINE MORE POWER MORE RPM FREE SAMPLE PROVES IT! FASTER STARTING

Now you can run your outboard or any 2-cycle engine without oil and enjoy power, economy and starting speed you never thought possible! Just stop using oil in your gas-oil mix and start using the most amaz-ing development in the lubrication field:

DEXADON! This remarkable formula is a high-pressure lubricant that replaces oil, giving 2-cycle engine users fantastic results: 200 RPM increase; 10% more gas efficiency; 50% faster starting; longer engine life; elimination of oil fouling of plugs; prevention of sludge formation, smoke, odor—plus many more amazing benefits proved in use and verified by laboratory reports! Whether your 2-cycle engine is in outboard, scooter, lawn mower, auto or industrial equipment, you too will want DEXADON's money-saving advanged. tages. Guaranteed never to harm engine. Rush coupon NOW for FREE SAMPLE, instructions. No obligation!

Dexadon Puts You into Business Too!

Make up to \$300 and more weekly distributing DEXADON to marinas, hardware and marine sporting goods stores, to industrial firms and 2-cycle engine users. DEXADON sells fast after sensational 2-minute demonstration-gives you repeat orders automatically after first sale! Mail cou-pon now for FREE details—or send \$1.00 for Sales Dem-onstrator Kit, credited to your first order for 48 units of DEXADON.

DEXADON, 222 4th Ave., Dept. M207, New York 3, N	.Y.
☐ Rush FREE sample of DEXADON. ☐ Rush FR money-making details. ☐ \$1 enclosed; rush Demostrator Kit.	EE on-
Name	
Address	
CityZoneState	



BENJAMIN AIR RIFLE CO., 852 MARION ST., ST. LOUIS 4, MO.

Boat Plans Patterns Frame Kits

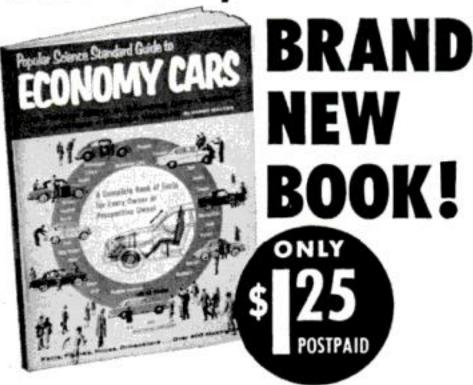


KIT CATALOGS - Over 50 Models - Preassembled. Runabouts, Cruisers, Fishing (8'to 19'). Anyone can assemble, Complete Marine Accessories, Fiberglass plastics, trailers, paint, etc. Also CATALOG on 50 Modern Plans and Patterns. Prefab Frame Kits-All types best for the amateur builder.

CREDIT TERMS

SEND 10¢ FOR 2-COLORED CATALOGS-NOW

Everything you want to know about Economy Cars in this



Popular Science Standard Guide to Economy Cars is the year's biggest value to any man buying a car today! Completely illustrated with more than 400 photos and cutaway drawings! Gives actual facts, figures, prices and dimensions of every foreign and U.S. economy car on the market today!

Thousands of never-before-published facts on gas mileage, initial cost, repair and upkeep, leg and head room, safety features, comfort, road-ability, transmissions, spare parts, accessories. Schematic drawings show you in feet and inches actual space in every model! Amazingly complete in all details! Handsome photographs let you compare and pick the car that suits your family's needs best!

THEY'RE ALL HERE: Minicars, Compact Cars, Small Cars, Convertibles, Sedans, Station Wagons! Frankly details and discusses the advantages and drawbacks of each of the 37 names manufactured today. All information based on actual driving experience in stock cars. Handy Glossary of Terms.

Don't delay! Order your copy of Popular Science Standard Guide to Economy Cars for just \$1.25 NOW! Guaranteed to please you or your money back!



	STATE OF THE PROPERTY OF THE P	(3		V
<u>—@</u>		\mathfrak{D}_{I}	FATO)9 ¢	4 @	
:	MAIL	THIS	COUPON	, NC	W!	

MAIL THI	S COUPON,	NOW!
Popular Science 355 Lexington Avenu	Publishing Inc	759 N. Y.
Here's my remitta Popular Science St illustrated and bou per copy, postpaid	andard Guide to	Economy Cars, paper, @ \$1.25
Name		
Address		
City	Sta	ite

RUPTURED

BE *FREE* FROM TRUSS SLAVERY

Surely you want to THROW AWAY TRUSSES FOR-EVER, be rid of Rupture Worries. Then Why Do you put up with wearing a griping, chafing and unsanitary truss the balance of your life? If you do, it will NOT be through necessity but through choice on your part.

Now there is a new modern Non-Surgical treatment that is designed to permanently correct rupture. These Non-Surgical treatments are so certain, that a Lifetime Certificate of Assurance is given. Write today for our New FREE Book that gives facts that may save you painful, expensive surgery. Tells how non-surgically you may again work, live, play, love and enjoy life in the manner you desire. There is no obligation. Excelsior Medical Clinic, Dept. H6224, Excelsior Springs, Mo.

BUY DIRECT FROM JAPAN \$7 50 per dozen ppd. Dozen Lots Only Free Catalog Of Things

IMPROVE your GOLF with NEW POWER BALLS



USGA Approved

Allows you to get more distance and accuracy. High compression-liquid center. Resists bruises, stains, scuffs, cuts and chips, Won't turn yellow. Check or Money Order, Satisfaction Guaranteed.

A. H. ALEXANDER, Inc.

P.O. Box 24, Setagaya, Tokyo, Japan

ATTENTION SKIN DIVERS!

U. S. Diver's Vigo Beginners Diving Lung

\$55.00 Postpaid Complete Line of Diving Equipment & Accessories

For new 1959 illustrated catalog please send 25¢ to:

MIDWEST DIVERS

Skin and Lung Diving Equipment

2240 W. Cermak Rd. Chicago 8, Illinois

When Writing to Advertisers Please Mention Popular Science

49-STAR AMERICAN FLAG



is being honored by a new red, white and blue U.S. postage stamp issued for the first time on U.S. postage stamp issued for the first time on July 4th. This will have a short life because a new 50-Star Flag will be needed when Hawaii joins the Union. We will send you a beautiful engraved envelope carrying the new stamp and posted on the first day of issue at Washington together with a FREE U.S. President stamp of Monaco PLUS a Grace Kelly Wedding stamp—all for only 25c, Or order 5 all different U.S. First Day Covers for just \$1. Money back if not completely satisfied. Ask for lists of other covers completely satisfied. Ask for lists of other covers.

K. M WALSH, Box 308-G, TUCKAHOE, N. Y.

THE KNIFE NAVY PILOTS HELPED DESIGN...

now available for civilian use

MARB!

NEW SURVIVAL KNIFE



Designed and engineered as the KEY SURVIVAL WEAPON for use by the Navy Air Corps, Marble's new survival knife is now being made available to the sportsman who needs an all-purpose knife that is virtually indestructible . . . a knife that'll never let you down. The knife is forged to withstand the heaviest of abuse. It saws through metal, it chops, it hammers, can be lashed to an oar or sapling and used as a spear. 101/2" long with a 6" high carbon manganese cutlery steel, ferro-blued blade. Knife and sheath are rustproof, waterproof, corrosionproof, and fun-gusproof. Sheath has pocket containing sharpening stone, 36" buckskin laces. Comes complete with instructions for proper care, and warranty card which guarantees knife against any defects in workmanship or materials. Price

\$13.95, postpaid with check or money order. \$1.00 deposit on C.O.D. please.

Marble Arms Corp.

Dept. 432, Gladstone, Michigan, U.S.A.

Quehenricast MINIATURE MODELS

5197 ONTOS SIX 106mm Rifles

\$1.75 SEND FOR

CATALOG only 35€

These are the same official scale. United States and foreign models used in pre-combat and recognition training by our government!

Cast in metal Scale 1" to 108"

COMET METAL PRODUCTS CO., INC. Richmond Hill 18, N.Y.



DETROIT REPORT

By Ken Fermoyle PS Detroit Editor

Loose Talk Costs Car Sales

Secrets are guarded jealously in the auto industry. Car makers



feel that premature reports of what's coming in future models dull the buying urge of customers for current offerings.

In addition to elaborate security systems, regular propaganda campaigns remind employees to keep their lips zipped. Posters of the "Loose Talk Costs Lives" type used in World War II—switched to read "sales . . . and jobs!" for lives—are common. Now even matchbooks, like the one pictured from General Motors Research, carry the warning message.

The confusion in compact-car names is the latest example of how tight Detroit's security can be. It resulted when both Chrysler and Ford, unknown to each other, selected "Falcon" as the monicker for their upcoming small cars. Chrysler hastily switched to "Valiant." (Chevy's tag: "Corvair.")

Rear-mounted starters are an excellent possibility when transaxles hit the road. Engineers feel they could turn the engine over for starting through the drive shaft; they like the idea of shifting additional weight to the rear for better balance. Batteries and generators could move back, too.



The PS crystal ball: "... We know that the present cycle of automobile design and capacity must in time run out ... The wanton consumption of horsepower in propelling heavy motor vehicles portends disaster. Investigations have shown that the average automobile carries on its everyday travels the equivalent of only 1½ persons. The streets of our large cities are absurdly congested with these great empty vehicles. The wise automobile manufacturer reads, along the road of progress, signs that point the way to a smaller, lighter, less expensive car ..."—Charles F. Kettering, then president of GM Research, quoted in PS, October, 1924.

More diesel engines will be on the road in coming years. Dodge now offers three new trucks with Cummins diesels. Ford is planning to buy diesels from an outside source, perhaps Cummins, for some of its bigger models. GMC will soon announce an extensive diesel program. Reason? Economy.

[Continued on page 204]

TIRE FACTS THAT CAN SAVE YOUR LIFE

ARMSTRONG TREAD INVENTION MAKES TIRES SAFER!

"Safety Discs" Make Tread <u>Grip</u> to Stop Deadly Skids - As No Other Tire Can

When you brake, so much pressure is put on your tires that the tread design can be squeezed to a smooth, slippery surface! This can't happen with Armstrong Tires.

because hundreds of "Ounce of
Prevention" Safety Discs, molded
between the tread ribs, hold the
tread open, always ready
to grip the road.

SEE THE DIFFERENCE

Fists show how Safety Discs keep tread open - without discs, tread can squeeze shut



Experts Find: SKIDS NOW MOST COMMON HAZARD

Higher speeds, heavier cars are blamed for making skids the most frequent factor in accidents, and by far the commonest tire failure. Ride safer on Armstrong Miracle Safety Disc Tires – see your Armstrong Dealer, listed in the Yellow Pages.



ARMSTRONG TIRES

Like fingers of fist above, tread CAN'T be squeezed shut. No matter how hard you brake, Safety Discs hold tread ribs apart, so edges can "bite" the road.



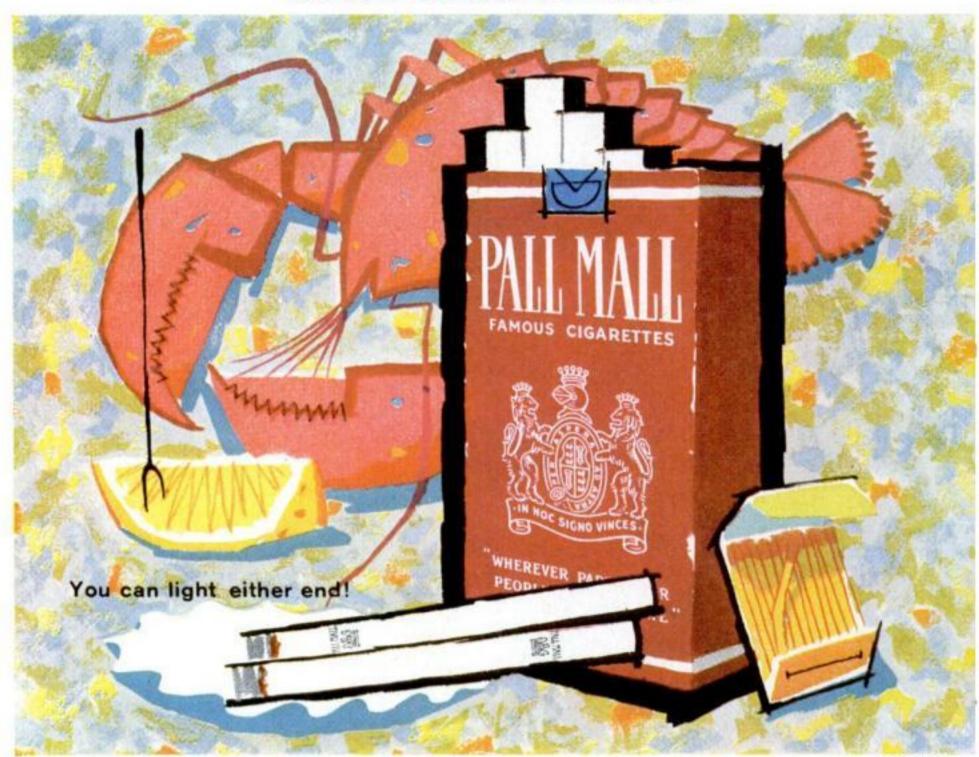
ORDINARY TIRES

Without discs, tread can easily squeeze shut, like fist above. Gripping edges are pushed together. Even brand new tires can go smooth like this . . . and you skid!

ARMSTRONG RUBBER COMPANY
Home Office, West Haven, Connecticut

Get satisfying flavor...So friendly to your taste!

NO FLAT "FILTERED-OUT" FLAVOR!
NO DRY "SMOKED-OUT" TASTE!



@ A. T. Co.

See how Pall Mall's famous length of fine tobacco travels and gentles the smoke—makes it mild—but does not filter out that satisfying flavor!

HERE'S WHY SMOKE "TRAVELED" THROUGH FINE TOBACCO TASTES BEST



You get Pall Mall's famous length of the finest tobaccos money can buy.



Pall Mall's famous length travels and gentles the smoke naturally . . .



3 Travels it over, under, around and through Pall Mall's fine tobaccos!

Outstanding . . . and they are Mild!

Product of The American Tobacco Company "Tobacco is our middle name"



Here Come Cars Without Wheels

By Martin Mann

PS PHOTOS BY W. W. MORRIS AND ROBERT BORST

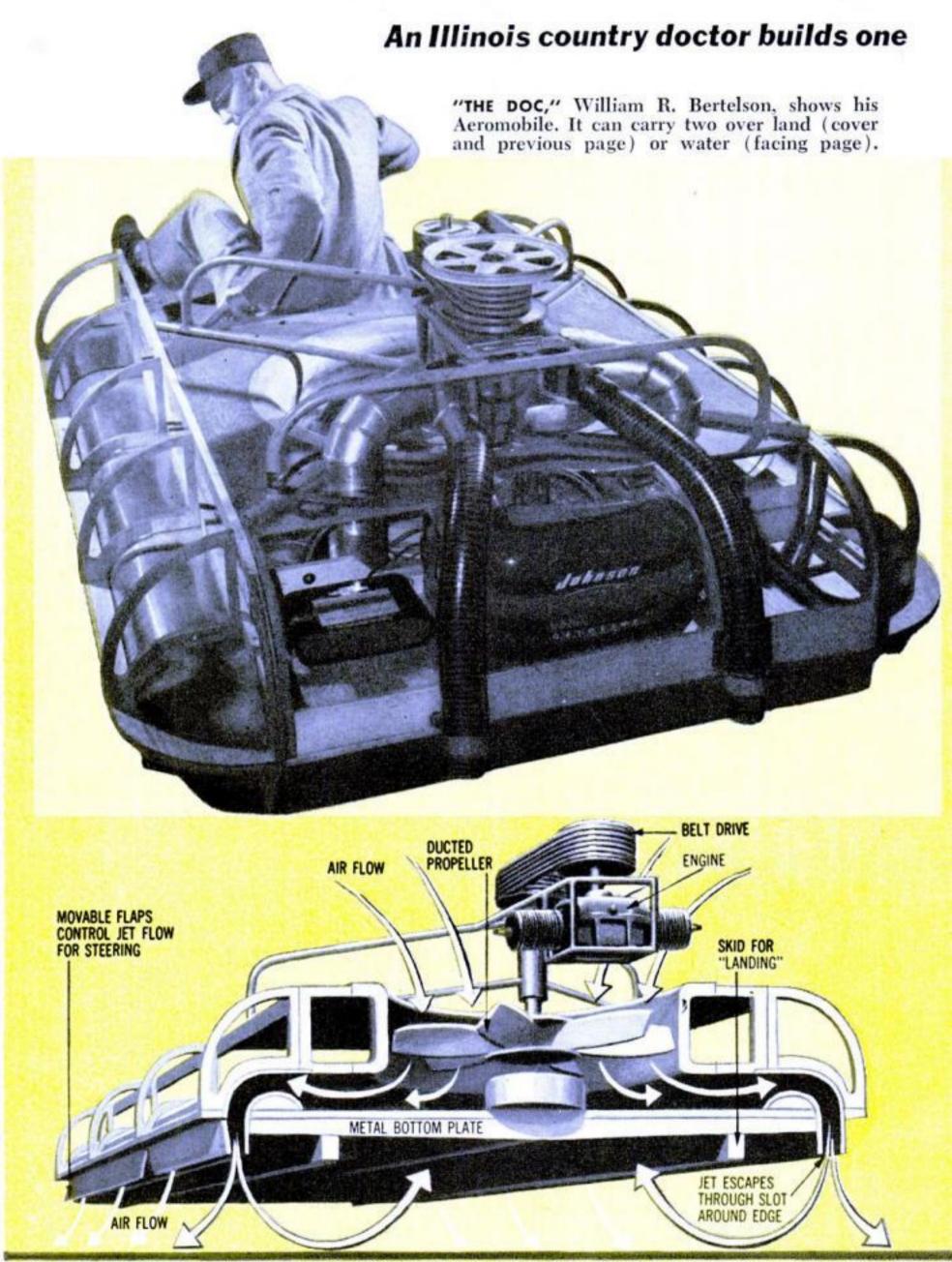
I MAGINE a car without wheels, skimming four feet off the ground across roadless terrain.

Imagine a ship carrying ocean-liner loads continent-to-continent with steam-ship economy—but gliding above the waves at 150 m.p.h.

Imagine a train, following a rail it never touches, beating airline time New York to Boston, Chicago to Detroit, or San Francisco to Los Angeles.

The first test models of such fantastic vehicles have already "flown." (They don't really fly because they never get more than a few feet up.) Several more will be skittering across fields and bays before the summer is out. These are not table-top research toys, but big mancarrying vehicles.

What are they? Air sleds. They slide on compressed air blasted down by a pro-



GROUND SQUASHES AIR AROUND AND UP UNDER BOTTOM PLATE TO PROVIDE LIFT

CUSHION OF COMPRESSED AIR holds craft few inches up. Airplane prop pushes air down into chamber, out through slots at edges. Escaping

air jets squash against ground (or water) and curve in to form supporting air cushion. Flaps steer machine by adjusting flow of air jets.

of the first full-scale cars-without-wheels. And it works

peller. This air cushion holds them up the way a fountain supports a ball bobbing in its water jet. Freed from friction with the ground or water underneath, they zoom forward at airplane-like speeds.

(In the trade they are called groundeffect machines because they use the "ground effect"—the increase in lift that an aircraft gets when close to the ground.)

Some use two engines: one to push down for support, another to push back for propulsion. Others move on a single engine by dividing its air blast with ducts. Still others unbalance the supporting cushion (with dampers) so that the sled keeps "falling downhill" in the direction you want to go.

They really work. It sounds crazy, all right. But I have seen these air sleds with my own eyes. I rode one, and tried my hand at piloting another.

They threaten to turn transportation inside-out, giving you a sports car, speedboat, half-ton truck and back-pack helicopter all rolled into one.

There is no restriction on speed. Even a puny beat-up old engine gets you to 60 miles an hour easily. The drafting-board doodlers are thinking about 150 m.p.h. over water, 500 m.p.h. over land. But you could go faster—or as slowly as you want, since it's not the forward speed that keeps you up.

The air sled can travel anywhere—across land, sea, marsh, snow, ice or whatever. It doesn't need a road. It will settle down or take off from any more-or-less level spot you find.

And the big thing: It should be cheap. You get a lot of load-carrying capacity for a small expenditure of horsepower. Compared with a ship the same size, a large sled should transport the same tonnage, the same distance, for the same cost —but five times faster!

A breakthrough like this could shake up living patterns here and everywhere else. Any stream or stretch of open country becomes a highway, any beach a harbor.

Fishermen and hunters will be able to zip into locations that are now practically inaccessible. Lonely farm families will get to town, winter and summer, as easily as if they lived alongside the freeway.

Commercially, the deep-water harbors



NEIGHBOR-HELPERS sweat with Dr. Bertelson over cranky engine before craft's maiden voyage.

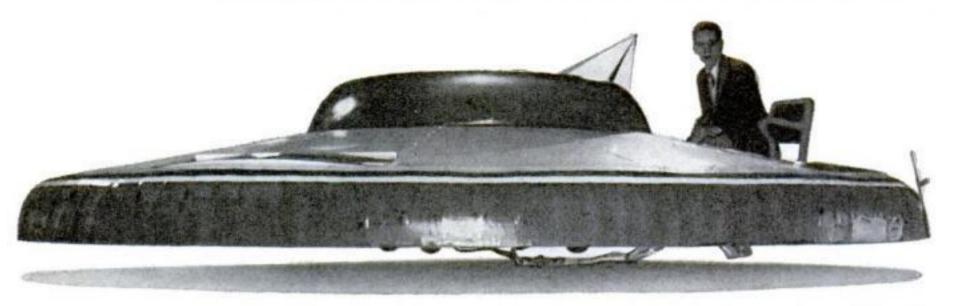


ALOFT AND SLIDING DOWN BEACH, it almost gets away. That's PS reporter Mann holding it back.



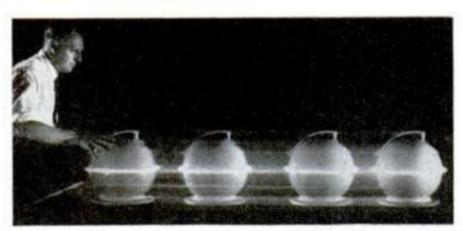
IT FLOATS—OR FLIES—and kicks up drenching spray. Craft was easily maneuvered over water.

Princeton researchers use big working model to check out control schemes for wheel-less Army vehicle

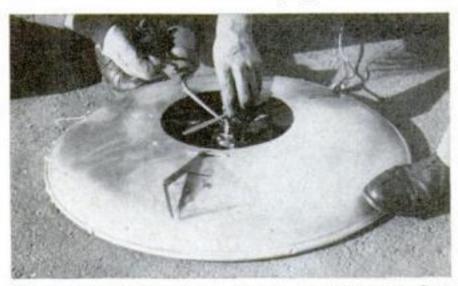


powerful enough to carry a man, Princeton's "Flying Saucer" doesn't because there's no place for him to sit. It uses a two-horse electric

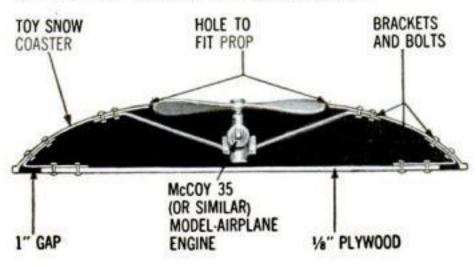
motor (notice wires trailing underneath). PS' Martin Mann, who tried his hand at joystick control (right rear), reports: "It's not easy."



FLYING VACUUM CLEANER, which Hoover has been selling since 1956, rides on an air cushion much as the new man-carrying air sleds do.



model is easy to copy. Shell is child's aluminum snow-coaster with hole cut in center. Brackets support model-airplane glowplug engine (a McCoy 35) in hole. Bottom plate is 1/8-inch plywood disk fastened to shell by brackets. Fin is decoration. It will scoot across the lawn at one-inch altitude and good speed.



that are great port cities' richest assets would be obsolete. Wide beaches, gently sloping, are nature's own docks for big freighter air sleds. The centers of trade might shift from New York and New Orleans to the sand flats of Long Island and Florida.

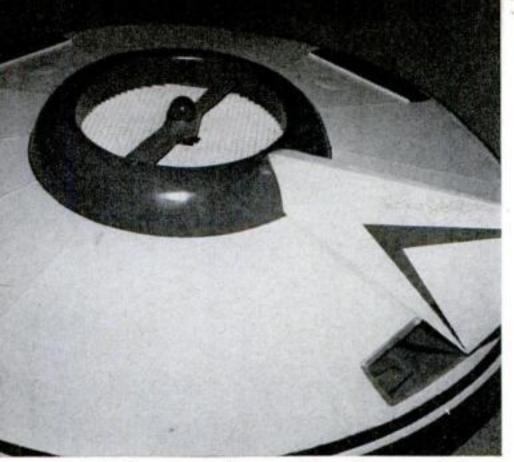
The military implications are clear. A few sleds will float a division across oceans right to a battlefront—no hazardous landings in the surf. Smaller types will provide ideal platforms to carry scouts, supplies, artillery.

No wonder the Navy, Army, Air Force, and National Aeronautics and Space Administration are plowing money into air-raft development. They are building actual vehicles, which are secret, as well as sponsoring fundamental research, which is wide open to anyone who can follow the math.

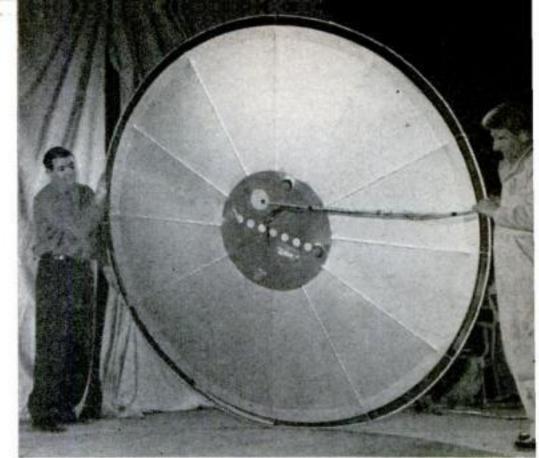
And a number of outsiders are running the government a good race, since you don't need much more than plywood, aluminum and an old gasoline engine to start with.

On the very day that congressmen in Washington gaped at a demonstration of small lab models, Popular Science's Bill Morris and Bob Borst were photographing a big man-carrying machine (see cover and previous two pages) in the corn-and-hog town of Neponset, Ill. (pop. 500). It was built in the back of an old feed store by lanky, sandy-haired physician-inventor-engineer William R. Bertelson. The Doc used his own money, the

54 POPULAR SCIENCE JULY 1959



FIN is just a marker, to identify control locations for pilot. Flaps, at four compass points, steer the craft by adjusting jet flow.



PLACING AIR JETS AT EDGE gives powerful lift from small motor. Eight-foot model is built of aluminum frame covered with plastic fabric.

expert craftsmanship of his friends and neighbors, and whatever time was left over from delivering babies.

Then there's Walter Crowley, a strictly independent designer, who rocked military brass last winter by flitting around a Washington golf course at 60 m.p.h. in his haywire rig. His company, Spacetronics, Inc., plans to make more substantial versions for the rich-fisherman trade in Florida.

Over in Switzerland, Carl Weiland will "launch" a 33-foot four-seater on the lake at Zurich later this summer.

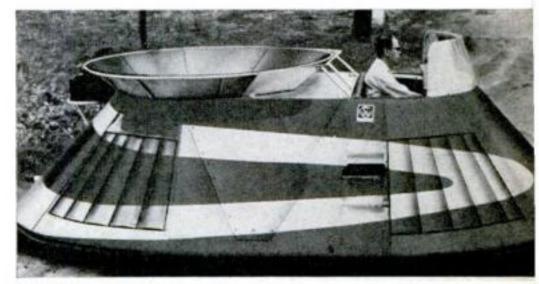
In Britain, Saunders-Roe (the airplane makers) are now test-flying the SR-N1 Hovercraft, a 30-foot, 450-horsepower two-seater, before starting on commercial channel ferries.

And back in old Dearborn, Ford Motor glided a secretary down the Research Lab corridor on a dingus that the press agents call a Levascooter, and showed off a model of a 500-m.p.h. jet-propelled "Glideair" vehicle.

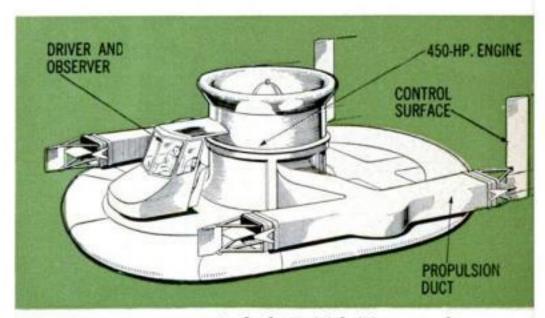
What holds them up? The idea of floating solid objects by blowing air under them is an old one, used for many years in frictionless bearings.

Airplane gyrocompasses have them; so does one kind of fixture table for holding work on a machine tool. But the most familiar example is the Hoover Constellation vacuum cleaner. It blows exhaust air out underneath the canister, and the canister actually floats, friction-free, off

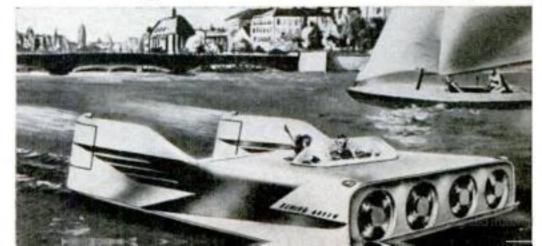
[Continued on page 194]



WANT TO BUY AN AIR SLED? Curtiss-Wright offers its "Air Car" to "qualified" purchasers for testing. Navy has shown similar craft.



EUROPEAN AIR SLEDS include British Hovercraft (above), already built and being tested, Swiss Flying Arrow (below), to be launched in summer. British plan commercial channel ferry.



PS Picture News





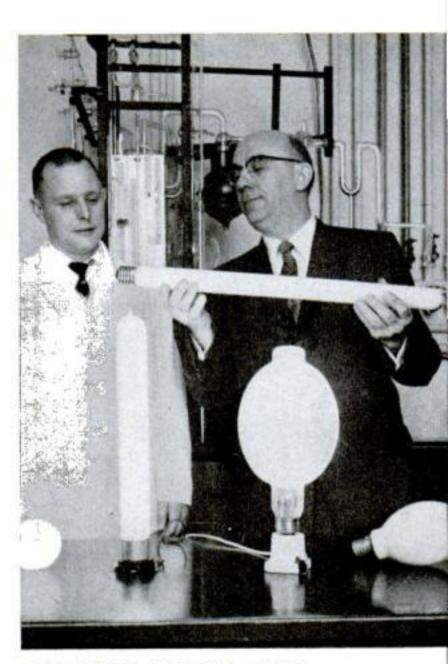
FLOATING 8-BY-8. With all eight wheels independently sprung, this new Chrysler-built Army 2½-tonner "knees" its way (at top) across rugged terrain. Lightweight construction enables it to float. Lower photo shows the vehicle being propelled by an outboard motor.

TUFTED PLANE. Spots on this twin-engine Grumman Mohawk are bits of yarn used to study air flow over the fuselage. One of the Army's largest planes and its first turboprop, it can operate from small, rough fields and will be used primarily for observation missions.





DRIVING SHELL. Closed-circuit TV, mirrors and a car mock-up would be used in a driving simulator, shown in artist's sketch at left, that is proposed by Cornell Aeronautical Laboratory. Models of driving and traffic situations would be set up and televised for a realistic hemispheric presentation to the "driver" inside the shell. Purpose of the device would be to study ways of correcting the main causes of automobile accidents.



SCREW BASE. This new

Westinghouse fluorescent lamp—

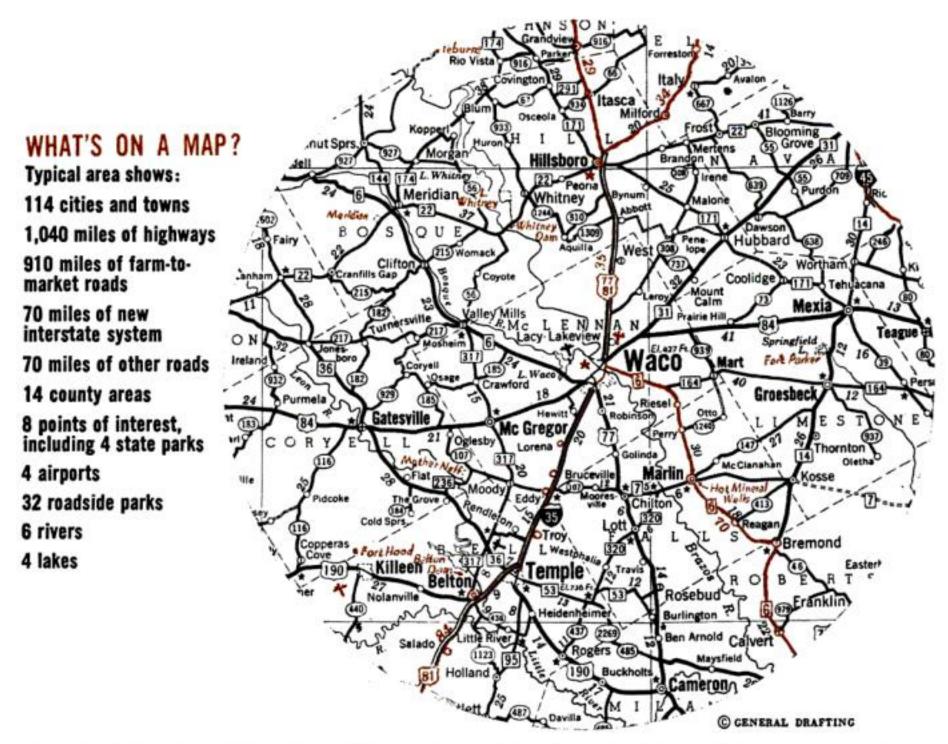
made in many shapes—fits an ordinary light socket. A self-

starter is in the base, and no



Getting the Most Out of Road Maps

Everybody uses 'em, but most of us have no idea what a wealth of valuable travel tips they offer for motorists on the move



(from General Drafting's Humble Oil map of

Texas) is typical of the detailed routing and general-interest information on modern road guides.

By Robert Gorman

IL companies this year will give away about 150 million road maps. They are designed to move you from here to there, ease your highway battles, and help you plan a vacation or detour on impulse for a picnic, a swim, or a spot of historic sight-seeing.

But modern maps do much, much

more. Some of this year's crop are breaking new ground in distinguishing between
controlled-access highways and other
good roads, between freeways and toll
turnpikes. If you look sharply, you may
pick up some subtle tips on skirting rushhour traffic, choosing between theoretically equal routes, avoiding tricky spur
roads, and approaching turnoffs and intersections in the proper lane.

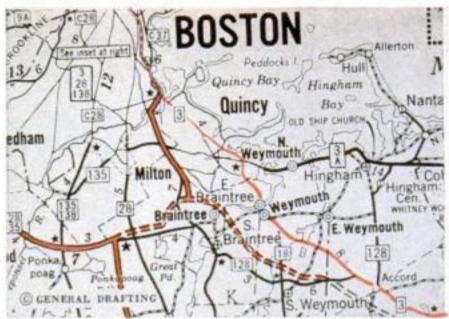
Lines and legends vary from map to map, some aren't explained in the key

ALL good maps feature the best, shortest, or easiest-to-follow through routes and point-to-point connections. Mapmakers also use many different line, color and symbol combinations to suggest other useful or interesting information. Mapping techniques—like those shown here—aren't standard and many aren't keyed. But once you spot a symbol or combination of symbols, the meaning is usually clear.

Depending on where you are and what map you're using, you may find details about toll rates, ferry schedules, radiodial settings, one-way city streets, Canadian border regulations, and the best time to cross Death Valley. Should you tank up before you cross the next state line? Many interstate maps chart gasoline taxes. Will tomorrow's drive carry you to higher altitudes? Elevation figures can cue you to check your radiator or leave a sweater handy on the back seat.

Novelty and specialty maps are also coming into their own. A New York-to-Florida map, lettered upside-down to help southbound motorists distinguish left from right, introduced as a gimmick a couple of years ago, has now become a popular staple. Some elaborate new maps feature extra information for fishermen, yachtsmen, pedestrians, and downtown sight-seers. One major oil company has just introduced a country-wide road atlas that sells for a quarter and is printed on a tinted paper that doesn't reflect glare even in bright sunlight.

One thing hasn't changed: Road maps continue to serve up a vast and delightful miscellany of information that has little or nothing to do with driving. You'll find latitudes and longitudes, names of state



DASHED DOUBLE LINES show roads under construction. Color fill on some maps shows sections due for early completion. They're your cue, if route is on your way, to inquire locally.



TRIPLE-LINING—to indicate limited-access highways—will appear for the first time this summer on a new set of Rand McNally maps. Toll and free routes are distinguished by color.

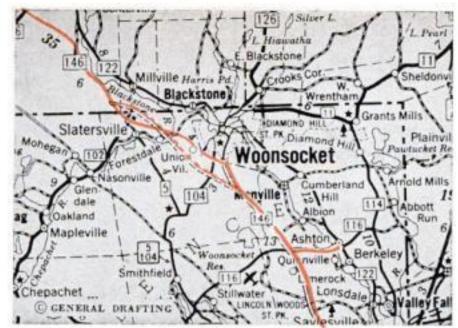
flowers, outlines of Indian reservations, and locations of streams and brooks. Projected roads—which appear on maps long before they're open to traffic—are no help in navigation, but they could be important if you're picking a site for a new home or business. County seats and boundaries may be significant, say, to a textbook salesman routing his way from school board to school board. But for most of us they are just part of that treasury of road-map lore that contributes to the fun of driving.

What It Costs the Oil Companies to Keep You Rolling

OIL companies pay between four and 10 cents—and an average of over seven—for each map you pick out of a rack. Price differences are reflected mostly in sheet size,

number of colors used, supplementary information, inset guides, frequency of revision, and whether it is drawn to order or printed from a stock impression.

Three firms—Rand McNally, H. M. Goushá, and General Drafting—supply practically all oil-company road maps; they also operate touring services for many of their



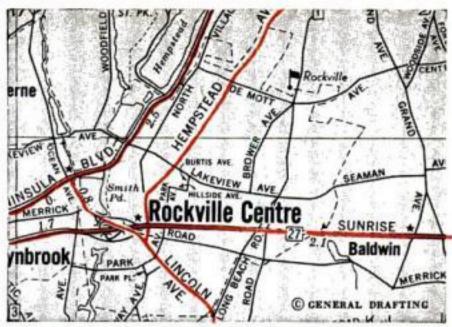
YOU'LL TURN left and right above Smithfield to keep going north on Mass. 104. General Drafting maps exaggerate some jogs to alert you to the turn, help you avoid tricky spurs.



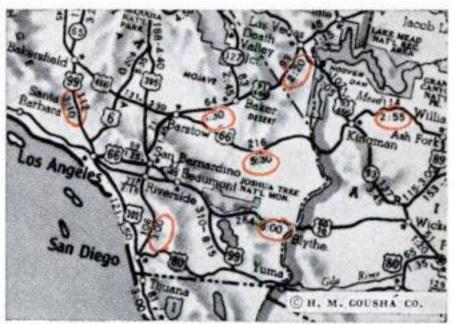
TRIP DISTANCES between major cities are commonly overprinted on H. M. Goushá maps. They simplify mileage counting and highlight the best—or good alternate—intercity routes.

Road maps can also confuse and mislead. Many of the special ones drawn for ferry operators, chambers of commerce, motel chains and the like are designed to do just that. They tend to exaggerate sometimes grossly distort—the routes their sponsors would like you to take. A few oil companies give a little extra thickness to special routes serviced by their stations. But on the whole, maps published for petroleum marketers are models of honest, unbiased cartography.

That doesn't mean they're all alike.



SECONDARY ROADS (like Lincoln Ave.) are given first-class prominence on some maps to hint at bypasses for routes that are apt to choke up at rush hours or on summer weekends.



DRIVING TIMES, as determined by typical runs, appear on some maps below point-to-point mileages. They summarize significant facts about speed limits, road and traffic conditions.

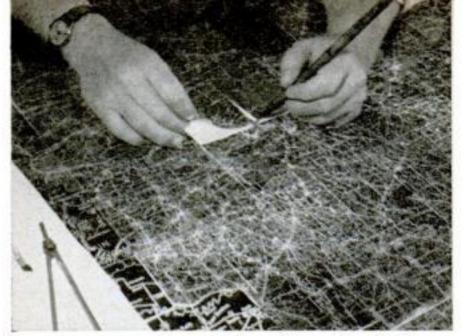
They vary greatly according to the map's scale, what it's to be used for, and where an individual editor draws the line between completeness and clutter. Most maps emphasize through routes and point-to-point connections; a few include details of parkway entrances, exits and interchanges. Some maps go further than others in classifying roads by type, width, and driving ease or safety. Many are designed primarily as vacation and sight-seeing guides.

So the use you can get from a map de-

customers. Like the tour services run by the oil companies themselves, these are set up to provide answers to your questions. They'll select fast or scenic routes to anywhere, furnish marked maps, travel tips, up-to-theminute information on road conditions. One service planned a cross-country trip for an expectant mother that would keep her handy

to hospitals all the way; another gave a bus load of musicians exact mileages between 82 one-night stands.

Between maps and tour inquiries (which cost up to two dollars apiece to handle), gasoline companies spend an estimated \$15 million a year to win your good will and make it easier for you to use up their products.

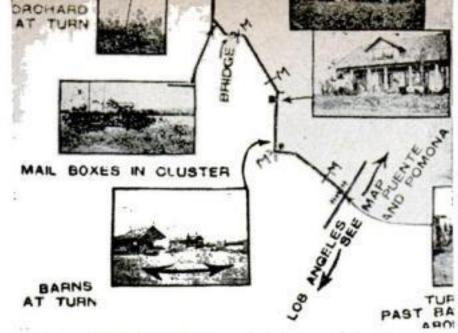


MAPS ARE COMPILED, often, from detailed surveyors' charts. They're edited, photographically reduced, then assembled on a uniform projection like the chips of a mosaic.

pends on many things—its purpose as well as its basic quality, its size, and how up-to-date it is. A lot depends, too, on whether you know what to look for and how to avoid some common pitfalls.

Don't take anything for granted when you're map-reading far from home. If you're from Texas you probably think of a graveled road when you see a ticked line; in Massachusetts it stands for a first-class hard-surfaced road. Don't try to use a state or interstate map for locating street addresses or exploring back roads near your vacation hideaway. Most of the lesser ways just aren't there; if they're important, pick up a city, county or township map, even if you have to pay for it. Look out for scale variations on companion strip or state maps. They range all over the place, so it's easy to misjudge distances on longer trips.

And beware of dog-eared, old-looking maps if they don't show an issue or copyright date. A map's age can determine its usefulness. It used to be common practice for mapmakers to incorporate

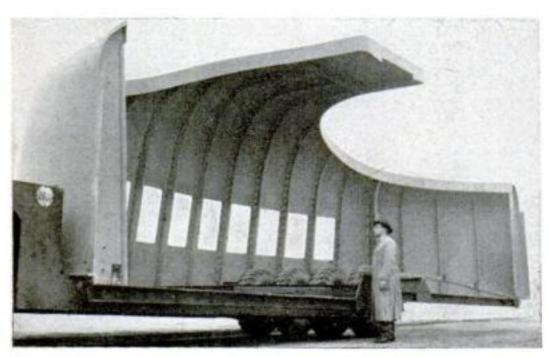


EARLY ROAD ATLASES used photos of landmarks, turns, and intersections to guide drivers. Otherwise, before highways were numbered and posted, one route looked just like another.

one or two deliberate errors in a drawing as a form of copyright protection. If the errors appeared on somebody, else's map it was easy to prove that the drawing had been swiped. (For years one map showed a non-existent town, Ladrone, Pa., from the Spanish "ladron" which means "thief.") Trick places have now disappeared. Mapmakers say sadly they don't have to try for errors. Despite their best efforts, they just can't keep them out.

Nor can they keep fully up-to-date, no matter how hard they try. Thousands of miles of new roads open each year and construction begins on thousands of others. Los Angeles County alone adds between 300 and 500 streets a year. So before a new map even comes off the press, its publishers are gathering material for revision. It comes from state and county highway departments, postmasters, town clerks, their own field investigators, oil-company route men and, very often, from map hobbyists. One Boston letter carrier spends his days off checking

[Continued on page 196]



60 POPULAR SCIENCE JULY 1959

What is this?

Can you identify the object pictured at left? Check your answer below.

ANSWER: It's not part of an air-plane, or a section of prefab house, but the one-piece front wall and roof of the command bridge for the new German liner Bremen. The 2½-ton bridge will be the highest super-structure aboard the 32,000-ton ship, structure aboard

Rigger Cranks Himself Skyward

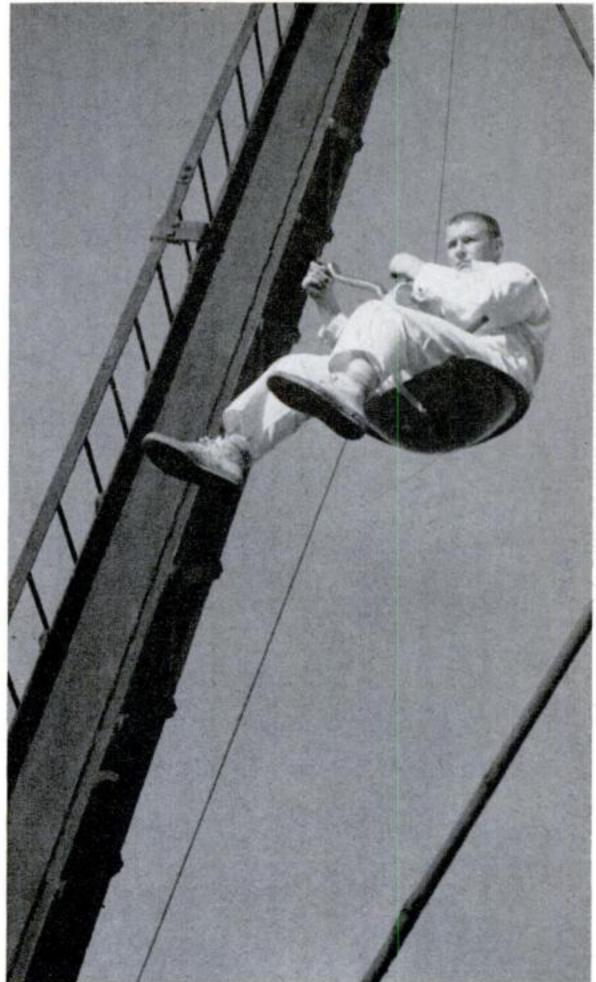
THE steel-nerved men who climb tall structures for a living are now going up higher and faster by means of a device that actually hauls itself up, using a cable merely as a track for riding.

There is no limit to height, as with the conventional scaffold system, where drum and cable are carried on the scaffold, and the cable is wound on like thread on a spool.

Only a few cable turns are taken around the Sky Climber's drum. Then, hand-cranked, or powered by compressed air or electricity, gears take the high-riding unit up or down.

AIR-POWERED UNITS, one at each end of a scaffold (below), can lift a ton at 30 feet a minute. There is an automatic safety-load brake.





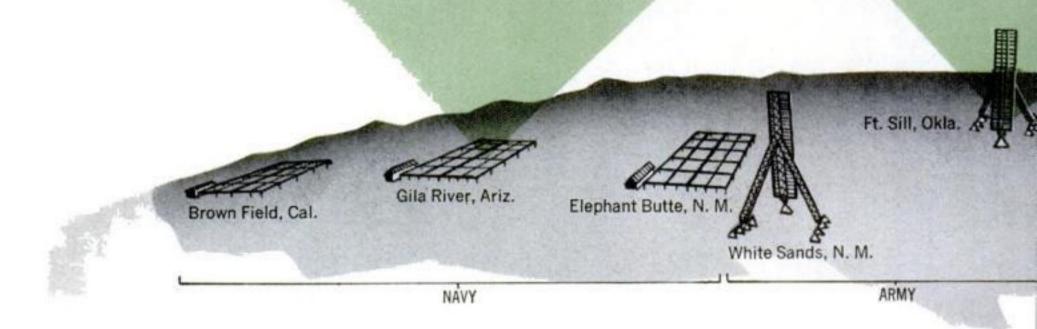
HAND-CRANKING himself aloft in the comfort of a bosun's-chair attachment, rigger above can climb 10 feet a minute. Slightest downward slip automatically locks an emergency brake that grips the cable.

is shown at the right. Electric-powered unit (not shown) has magnetic motor brake. Inventor Carter H. Arnold, Redwood City, Cal., gave up rigging to develop the device.



EXCLUSIVE

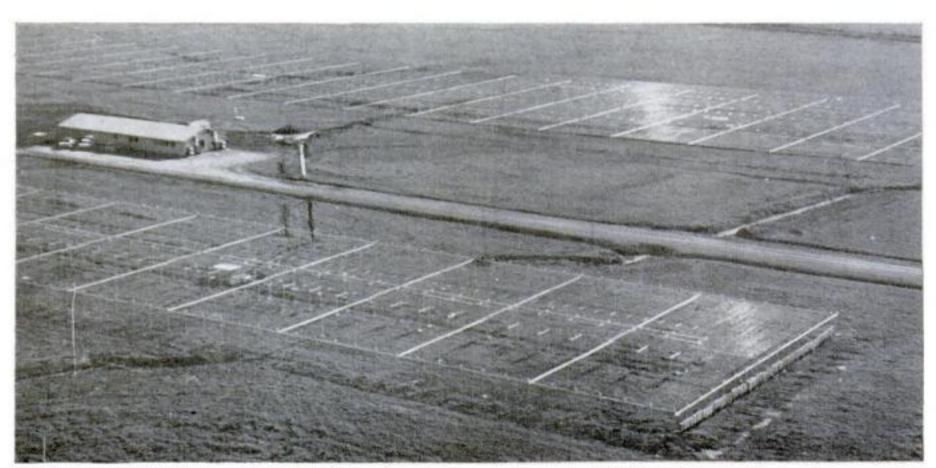
U.S. "Space Fence" on Alert for Russian



FANTASTIC electronic fence, one that spans America from coast to coast, is now being completed by the U. S. Government. Cloaked in semi-secrecy, it has been built in a crash program under way since just after the Russians lofted their first Sputnik into space.

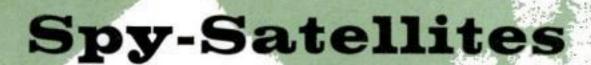
Its deadly serious purpose: to warn us if and when America is scrutinized by silent space spies.

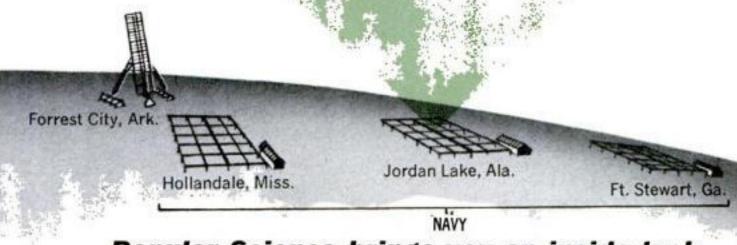
Will the Russians orbit satellites without telling us? They certainly might. A report from Bochum Observatory in West Germany says they already have. If they



ACRES OF ALUMINUM "CLOTHESLINE"—forming antenna for one Navy section of satellite fence

-gleam in Mississippi sun. Taut antenna wires vibrate in breeze, buzzing like a million bees.

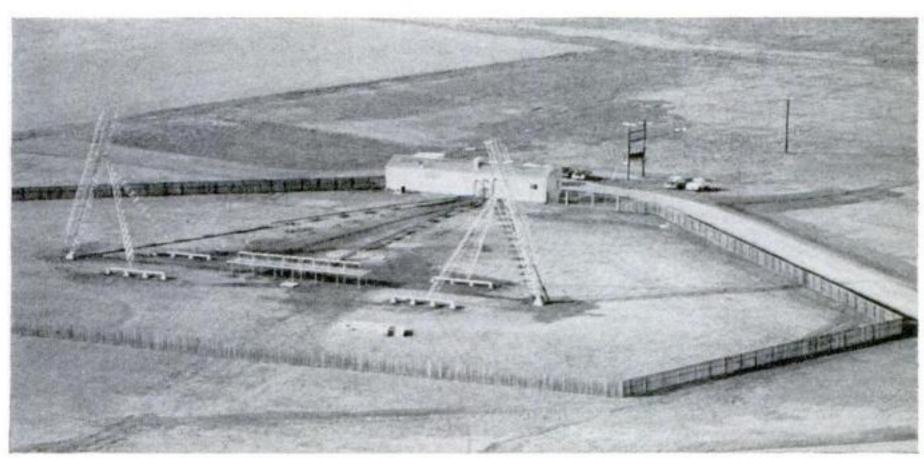




Popular Science brings you an inside look at the fantastic electronic network that guards our space frontier round the clock

did, would they load their secret satellites with TV cameras, infrared sensors, and means for getting the information back? Again, they certainly might. And they have publicly stated their plans for satellites "guaranteeing constant observation over the entire surface of the earth." So

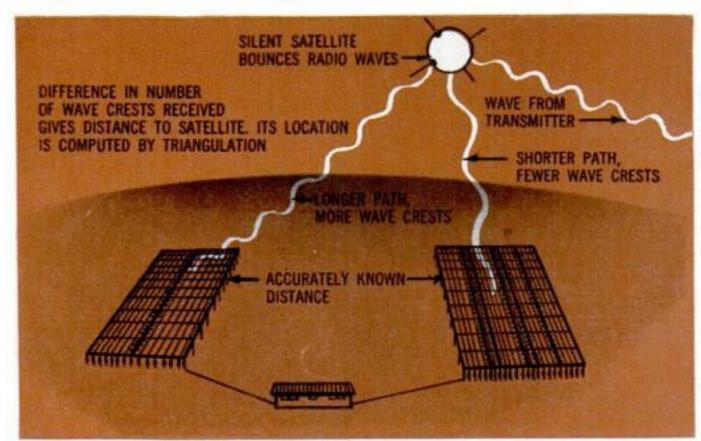
whatever—if anything—is streaking silently by above us, the U. S. Government needs to know about it. This is why we have built a "space fence" with invisible radio pickets to signal us the instant anything shoots past. The new fence goes far beyond any defenses the U. S. has had



PROJECTING THIN FAN OF RADIO WAVES, transmitter at Ft. Sill, Okla., puts Army's link in

space fence high into sky. Satellites crossing fence reflect waves back to far distant stations.

Crash program for U.S. space fence split job between



NAVY'S MINITRACK, originally developed to work on signals from U. S. satellites, was adapted by the Naval Research Laboratory. It measures distance to "object." Waves reflected from satellite to two receiving antennas travel different paths, contain different numbers of wave lengths. Ground equipment counts difference and computes the distance to the satellite.

before. It far outreaches such bomber-oriented fences as the Pine Tree and the Distant Early Warning (DEW) Lines. It reaches 1,000 miles straight up, with a capability, at that distance, of detecting a spy satellite no bigger than a bathtub.

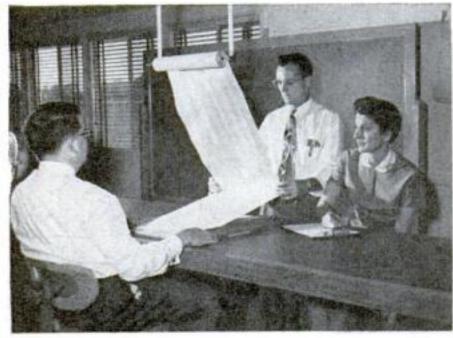
The problem, as an Army electronics engineer told me, is "like sitting on your porch and detecting a mosquito in the next county. Not only that, but telling precisely where it is, where it's going, and how fast."

Naked America. The need for an electronic screen burst upon military men—several of them, in different offices, at roughly the same time—as soon as the implications of Sputnik I sank in. If the Russians could orbit heavy satellites, they

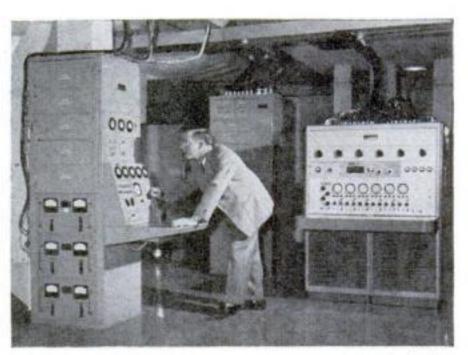
could also load them with observation gear. This could be programed to report when back over Russia. Or the space spies could perhaps be designed to leave orbit for recovery in Asia. Actually, the U. S. has sent up the first of a series of observation satellites of its own.

What could satellites see? Even from a height of more than a hundred miles, TV cameras could detect much of military value: the presence and layout of secret bases, expansion of strategic industries, major construction projects. Infrared detectors—their amazing capabilities still largely under security wraps—might do more yet, telling skilled interpreters what work was going on in a specific area.

Realization of all this hit the Army



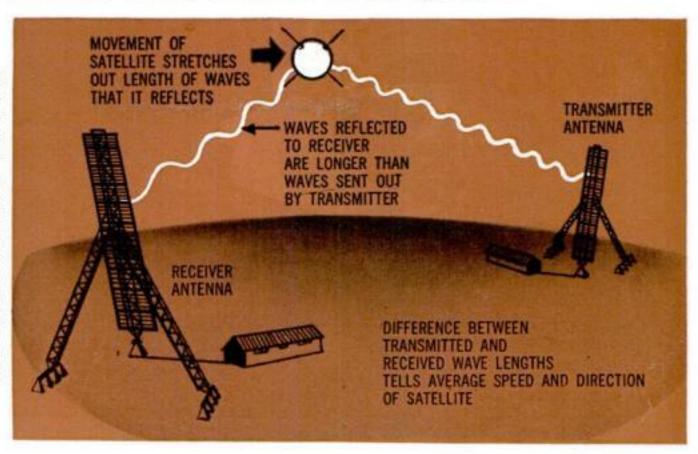
TRACKS OF SATELLITES—all so far have been "friendly"—are shown by graphs. These, being folded above, will be coded and teletyped to Washington for electronic analysis.



super-accurate clock, being adjusted by engineer Edison A. (Red) Thomas, is critical part of Minitrack. Staff—nine men and secretary—is furnished by contractor (Bendix).

Army and Navy; each uses its own favorite system

ARMY'S DOPLOC was developed by Ordnance's Ballistic Research Laboratory for our own satellite program. A glorified version of police speed radar, it gauges motion by Doppler effect: the change in length of a wave reflected by a moving object. Army and Navy sections now operate independently while improved, singlesystem space fence is being developed.



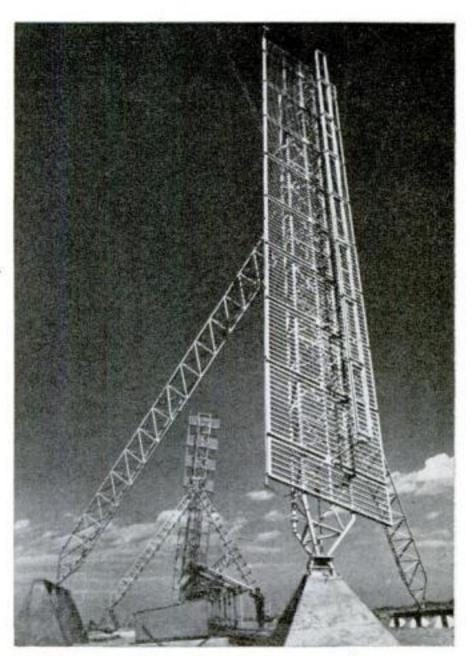
hard. The continental United States was stripped of privacy, the oceans no longer broad barriers to prying eyes. For the first time in American history, an enemy might watch us unawares.

No place to hide. The Navy was even more unsettled, and for good reason. Traditionally it had relied on the vastness of the earth's seas as a hiding place and near-perfect cover for ship movement. A task force or convoy could cruise for days or weeks lost to the outside world. But not now. A seeing satellite could now sweep its unblinking eye over the entire globe in hours. A task force or convoy could no longer cloak itself in radio silence and ocean vastness. Once spotted, it could be wiped out by a single H-bomb.

This disquieting new problem was passed to ARPA (Advanced Research Projects Agency), which appointed a committee, naturally. What happened next is cloudy: The Army and Navy like to keep squabbles inside the family. But there was evidently a rousing row over who would do what, and how. In the end everybody won. Both Army and Navy are now in the act, each with its own system. Both services are also pushing research for better systems.

Showpiece electronics. The first reaction of the ARPA study committee was simple: Reliable detection is impossible. That it has not proved impossible indicates the extraordinary sensitivity of both the Army and Navy detection systems. Both are showpieces of electronics engineering. The Army's receivers are so sensitive that they respond to a couple of individual quanta, the indivisible bundles of energy that make up radio waves. (Ordinary radio signals deliver uncount-

[Continued on page 198]



ARMY'S DOPLOC ANTENNAS transmit on same wave length as FM radio. Transmitter is a commercial model, modified to control signal closely. Philco crews operate the Army installations.

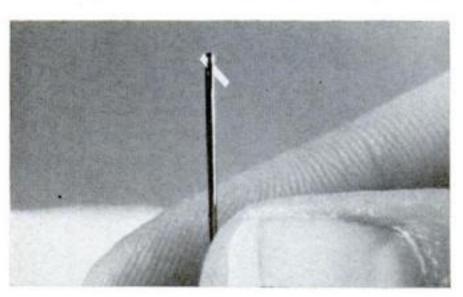


Scope Sight Makes a Dead-Eye Handgun

THAT pretty shot group above is the work of Robert V. Thompson, Clinton, Iowa, who did it by mounting the telescopic sight from a rifle on a .22-caliber handgun. The target is shown actual size, and Thompson plinked out the black at 35 yards.

When shooting, Thompson always looks for a rest for the gun. A piece of

rubber hose, slit lengthwise and slipped over the barrel, helps his accuracy when he rests the gun on a hard surface. For target shooting, he uses a padded rest. He finds the scope sight dandy for hunting varmints and rabbits. "It takes close shooting to hit rabbits right with a handgun," he says. "Head shots save a lot of meat."

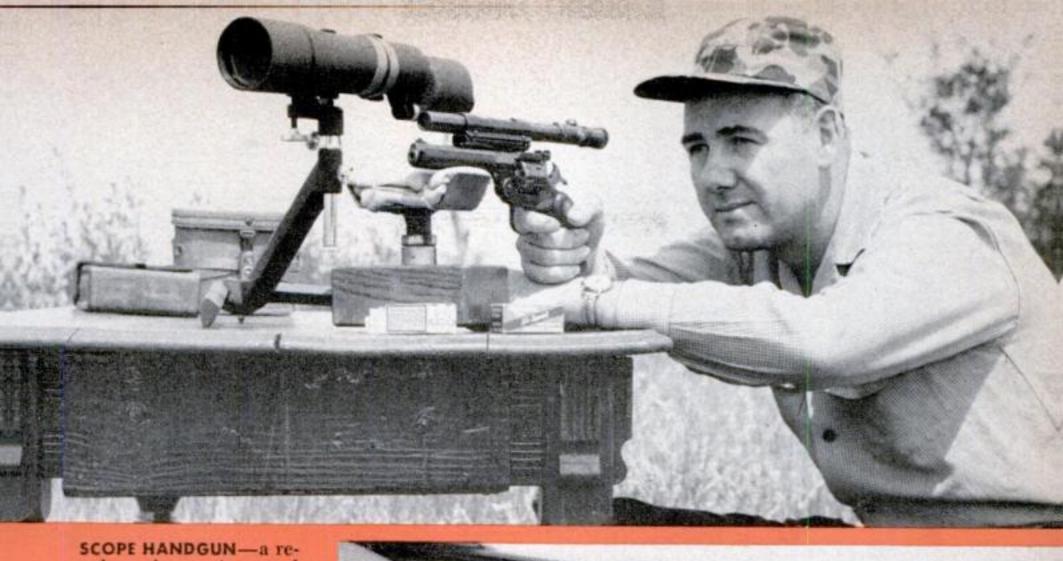


TINY COMPUTER PART. Inside this needle's eye is an RCA electronic part so small that 100,000,000 might fit in a cubic foot, approaching the compactness of human brain elements.



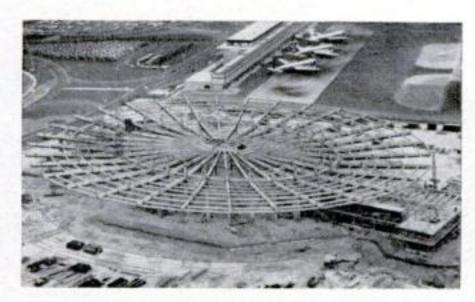
FRENCH MISSILE. U. S. troops in Germany soon will get this wire-guided rocket, made by Nord Aviation, Paris. It can destroy any known tank. Firing from mobile launcher is a one-man operation.

66 POPULAR SCIENCE JULY 1959



volver above-is zeroed in by shooter Bob Thompson. At right is shown his method for mounting scope sight on a pistol. He drills and taps two shallow holes on top to screw Marlin base adapter—shimmed to bring it level—to handgun. Pencil points to where adapter is peened to keep scope from sliding too far forward. Rear of adapter is filed down to clear pistol slide. Thompson used a Weaver Tip-Off mount and 330 Weaver scope, but any scope with 34-in, tube will fit.

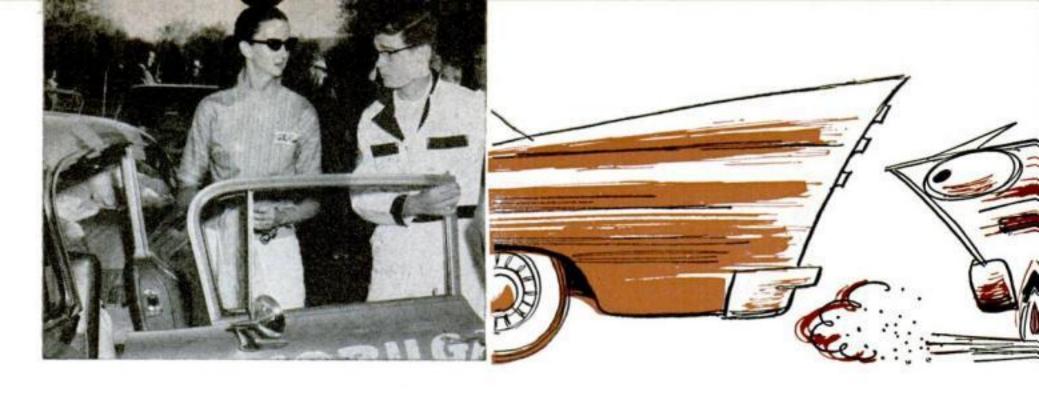




WHEEL OF STEEL. Air view of Pan American's new passenger terminal at New York International Airport shows steel-girder roof supports. Huge jet planes will be able to nose under cover.



SIMCA FOR '59. More glass area and vertically striped chrome grille distinguish new models of this French economy car. Shown above is the Grand Large, five-passenger, two-door hardtop.



Woman Driver Tells

By Mary Hauser as told to Wesley S. Griswold

Mary Hauser, the pretty brunette whose views on economical driving are printed here, won Class B in the 1959 Mobilgas Economy Run, against five contenders (four of them male), by averaging 22.3788 miles per gallon in a six-cylinder Chevrolet over the tough 1,898-mile course.

In the photo above, Mrs. Hauser chats, during a rest stop, with one of the two official

observers who rode with her.

I'm a woman, that I'm a lousy driver and don't know the first thing about how to get good gas mileage. So you're surprised, maybe even a little peeved, that I managed to win a class in the 1959 Mobilgas Economy Run.

Well, I'll admit that many women are stupid drivers. So are a lot of men. They have their minds on a thousand other things. They forget that there's a rear-view mirror or a side-view mirror—or anything at all except what's right next to the hood. At a stop light, they sometimes look left and right, but that's only because, as kids, they were taught to look both ways before crossing a street. Driving stupidly isn't a matter of sex but of attitude.

Most drivers—men and women—rarely give a thought to saving gas. I don't myself, usually. I love to drive—and drive fast. Ever since I was a kid, back in Indiana, a car has meant freedom and fun to me. On the open road, I like to cut corners—not to imitate racing drivers but just because it feels good to maneuver the car.

But I always think at least two blocks ahead. I expect every other driver to do something wrong. When I see a car coming along a side street, I anticipate that it'll try to cross in front of me. On the Freeway, I'm always watching front wheels, expecting them to turn into me.

This attitude makes anybody an alert, steady driver. And if you drive steadily,

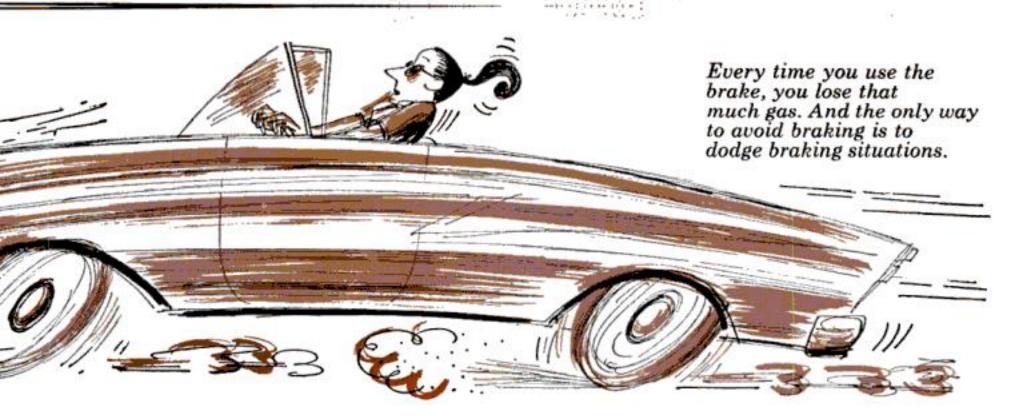
you're bound to save gas.

The most important thing I learned in practice was that every time I had to use the brake, I lost that much gas. The only way to avoid braking was to dodge braking situations. That meant anticipating when signal lights would change. It meant easy, gradual getaways from intersections where I did have to stop. It meant feathering back on the accelerator if it looked as if some guy up ahead might cut across the road. It meant never passing another car unless there was loads of room to do it. And it meant never going too fast over the top of a hill or around a corner.

Economy driving is very closely tied to safety: A consistent speed is better than erratic driving for both purposes. I quickly learned that a lot depended on the sole of my right foot and the seat of my pants. The sole had to be very sensitive to slight variations of pressure. The seat had to be equally sensitive to changes in momentum. For momentum is a crucial matter on an Economy Run. Once under way, you must maintain it as much as possible and vary

Most economical speed with which to attack the average hill: 45 m.p.h.





How to Save Gas

it as little as you can. It takes some doing.

Probably the most valuable lessons that the Economy Run taught me were how to drive away from a dead stop and how to climb and descend a hill with the least drain on the fuel supply.

I could instantly see the benefit to the pocketbook as I learned the techniques, for the car I drove for practice—a duplicate of the one I drove in the Run—was rigged up with instruments that showed, practically to the drop, just how much fuel was being used at all times. We couldn't use these instruments on the Run, of course, but by then I had a trained foot.

To move away most economically from a halt in a 25-m.p.h. zone, I learned to ease the car up to 17 m.p.h., feather back a mite as it shifted itself at that speed, then raise it gently to the 25-m.p.h. limit and hold it there. I got so I could do this with perfect smoothness.

The same smooth approach applies to getting under way from a full stop in a 35-m.p.h. zone, or where the speed limit is higher than that. Only, now the thing to do is press a bit harder on the accelerator—just enough harder to move the car up to 33 m.p.h. before it upshifted.

The most economical speed at which to start up the average hill is 45 m.p.h., the gadgets in the practice car told me. And I found I had to work at holding the accelerator steady throughout the climb. It's hard not to press it down further as the car slows toward the top of the rise. There's also the delicate business of easing off on the throttle gently so that the car never gets more fuel than it needs to keep within a hair of the speed limit on the downgrade.

But I found that I could be comfortable on the Run and still save gas. Men drivers rarely do that. They're victims of too much technical theory. They won't open windows when it's hot for fear of increasing wind resistance. They won't turn on the heater when it's cold because they'd rather freeze than use an extra gill of gasoline. They won't use the windshield wipers for the same reason.

Well, I opened my windows in the des-



Save gas by never going too fast over the top of a hill or around a corner.

ert, used the heater in the mountains, and when we hit a blizzard, I turned on the wipers whenever a car passed and threw slush over my windshield. As a result, I managed to keep going all through the storm. The men had to stop and scrape, every now and then, to see where they were going. I did better than some of them on gas mileage simply because I kept my wheels turning.

But you can't anticipate and avoid every obstacle. I found that the biggest handicaps on the Economy Run were not the weather, the time pressure or the road conditions, but the dodoes who pulled out from the curb in front of me without any warning.

It doesn't help much to be smart about saving gas if the other guy is stupid.

"I'd like to see them make..."



PATIO DINING ACCOMMODATIONS that could be built into an outside wall of a house. Table and benches would pull down for use, fold up flat for storage.—Bill Broadwell, Charlotte, N. C.



MULTIPLE-USE MOWERS. With a flexible shaft hooked to a power take-off, my mower could run a hedge trimmer, knife sharpener, and car polisher.—C. N. Breitenfeldt, Marathon, Wis.

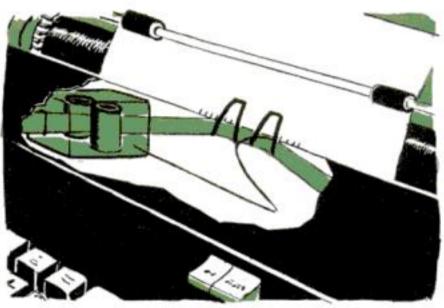


MORE LIGHT ON WAGONS. I'd like a manually operated switch on the tailgate so I wouldn't have to open a side door to see into the back.

—Gary Conley, Sheffield Lake, Ohio.



A BACK-SCRUBBING BATH BRUSH that could be attached to a shower wall. It should have a well for liquid soap and a pushbutton to dispense it.—A. T. Iberg, Highland, Ill.



RIBBON-RENEWING ROLLERS on typewriters. As the ribbon fed through, it would be re-inked and never need replacement until the fabric was worn.—John Ryder, Little Falls, N. J.

Everyone has his own pet idea of a gadget that he would like to see in general use. The five ideas illustrated above were suggested by POPULAR SCIENCE readers. What's

yours? We will pay \$5 for each one published. Please use Government postcards only. Write name and address clearly. Contributions cannot be acknowledged or returned.

Tales from the Casebooks of Our Air-Crash Detectives

By Devon Francis

AT 12:17 p.m. on August 4, 1955, the captain of an airliner aloft over Missouri broadcast an emergency. The nearest ground station acknowledged the message but received no answer. Three minutes later the plane radioed, "Springfield, are you reading 476? We have a bad engine fire."

That was the final word from the plane. It crashed minutes later; no one survived. The wreckage was burned rubble. The accident made no sense. The weather was good. The plane had just come from overhaul. The pilot and copilot were highly experienced.

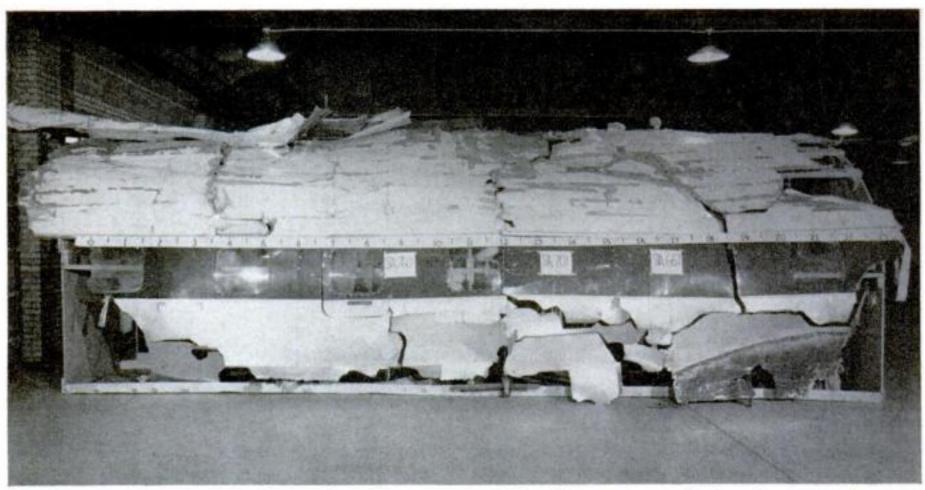
Yet within hours government investigators, grubbing in the debris, knew what had happened. Within days they had proved their case and taken steps to prevent its recurrence.

The speed with which they solved the mystery was all in the day's work. It's their business. Investigators for the Civil Aeronautics Board have found the rea-



ALL THAT REMAINED of a new DC-6 airliner, which crashed near Bryce Canyon, Utah, with a loss of 52 lives, was this chipchop of wreckage. Yet, within days, CAB investigators had deduced the cause of the accident; in less than a month, had proved their case by meticulous research. They began by establishing the se-

quence of structural failure—by finding pieces of the plane that had fallen off back along the flight path. A burned coat hanger was one clue; obviously the fire, reported by radio by the crew, had roared right into the passenger cabin. A piece of nylon was traced to a parachute flare, an aluminum rod to a radio mast.



PROBING FOR THE CAUSE of a crash near Longmont, Col., in which 44 persons died, investigators patiently searched for pieces of the airliner over a wide area where it had exploded in flight. Then they built a wood framework, covered it with chicken wire and fitted pieces

of the skin on it, with the above result. Near the rear baggage compartment they ran out of pieces—the disintegration had been complete. But they knew the plane normally carried nothing combustible in that area. Result: The disaster was traced to a dynamite bomb.

sons for scores of crashes in recent years. None of these government detectives is a political appointee. All are pilots themselves, including the CAB's veteran information officer, Ed Slattery. The chief investigator, James N. Peyton, once commanded a wartime bomber group.

Though these men flinch at the name "crash detective," they use many of the techniques of crime detectives. A scratch on a wing panel, a wisp of charred fabric, even the odor of a fragment of wreckage can be a vital clue.

The case of Flight 476. This was one



Ace of the Air-Crash Detectives: A Guy Named Joe

THOUGH the CAB stiffly claims that "all of our accident investigators are equally proficient in their work," the star of the team is a guy named Joe - specifically, Joseph Odilon Fluet.

He is, of course, a pilot, with 7,000 hours in his log book. Supervising a team of investigators, he works for days on end, catching catnaps on the job, until he is satisfied that he is on the track of the cause of an accident. The soul of outward calm, he confesses to a nagging nervousness until records and wreckage are put under guard.

Fluet has been in aviation 32 years. He joined the old Army Air Corps as an enlisted man in 1927 on his graduation from high school. He soloed in 1929. A crash investigator since 1942, Joe is so

known for his thoroughness and shrewdness in solving accidents that the tension relaxes in aviation circles whenever he assumes command of a case.

He has worked on many knotty ones. When a transport crashed seconds after takeoff from New York's La Guardia Field in 1957, killing 22 persons, he flew back and forth over the site in a helicopter to turn up clues. He was in charge of the investigation of a collision between a transport and a jet that culminated in the Federal Aviation Act of 1959.

After his inquiry into a shocking series of transport crashes in and near Elizabeth, N.J., six years ago, he was commended by a grand jury as "an extremely able and responsible public servant worthy of the highest traditions of the career system."

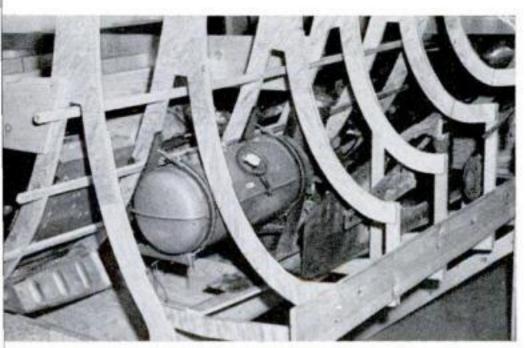
In his spare time, Fluet is an expert carpenter and cabinetmaker, and almost single-handedly built a summer home.



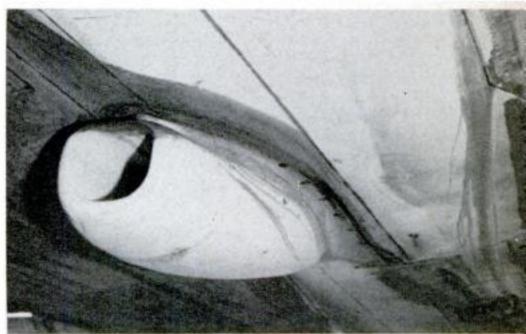
FAMILIAR SIGHT IN CRASH-RECONSTRUCTION is the simulation of cabin seating, using the remnants of chairs from the wreckage. This is the aft cabin of the plane that exploded near Longmont. In the foreground are seats that were just above the dynamite bomb—torn apart by

the blast. Another piece of conclusive evidence was a stewardess' waste container that had been collapsed inward at the bottom. The investigators, determining that the container could not have been battered that way by ground impact, knew the violence had occurred aloft.

of the easier ones. The right engine had burned free and dropped off in the air. Farther back along the flight path was the engine's No. 12 cylinder, broken off just above its bolt-down flange. It was obvious that fuel fed to the broken cylinder had blazed aft past the engine accessories. But what had caused the cylinder to rupture? That question led back to the airline's maintenance base. Records showed that the same cylinder had been pulled from another engine when eight of its fifteen hold-down studs had failed. A mechanic had neglected to inspect its



ONE OF THE MAIN TOOLS of the crash investigators is the wood mockup, reconstructing parts of an airplane that failed or burned. The "boiler room" of a plane that caught fire at Gallup, N.M., was built up for study like this, with plywood to simulate the airplane structural members around it. The cabin floor area above it supplied unmistakable evidence of the fire's epicenter near a gasoline-fired cabin heater. Contributing to the inferno, once the blaze got out of control, were such flammables as hydraulic fluid and lubricating oil as well as gasoline.



THE VILLAIN: Taking a hard look at the placement of the DC-6's belly scoop—which feeds air to the gas-fired cabin heater and air-conditioning system—investigators made some tests. Aloft, they pumped colored water, simulating gasoline, through a wing hole in line with the plane's gasoline-overflow vent. When the air-stream carried the stain to the scoop, crash detectives knew they had the answer to the Bryce Canyon and Gallup fires: In leveling their tanks, the planes' captains had unwittingly dumped gas into their own gas-burning heaters.



of the crash in Bryce Canyon. A mere half-mile more and the burning plane might have landed on the airport landing strip, enabling at least some of the doomed passengers and crew to escape. The immediate cause of the crash, the CAB investigators found, was the destruction of control cables by fire, too violent to be controlled by ordinary carbon-dioxide extinguishers, in the belly of the doomed plane.

hold-down flange for warping—ignoring strict rules in the overhaul manual. The warping produced extra strain on the cylinder walls when the flange was snugged down; and the strain led to a fracture that sent 30 persons to their deaths.

Strange twist. In another crash case, a DC-3 lost an engine minutes after take-off from New York's La Guardia Airport and crashed into the bay. All five persons aboard were killed. It looked at first like a case of faulty airmanship. Then the medical examiner made an electrifying discovery: Post-mortems indicated considerable alcohol in several of the bodies. Immediately the district attorney and a grand jury got into the act: If drunken pilots were flying over town, something should be done.

Meantime the CAB was quietly and methodically following its own inquiry. When the wreckage was raised from the bay, two tanks of de-icing alcohol behind the pilots' seats were ruptured.

At the customary hearing a Yale physiology professor testified that he had drowned rats in water having about the same concentration of alcohol that had been in the submerged cockpit. The rats'

[Continued on page 200]

Air-Crash Experts "Read" Blackened Debris Like an Open Book

CAB investigators say that their best techniques in unraveling accidents are "horse sense and perseverance." That's only part of it. They are also skilled in reading a number of fascinating technical clues. Here are just a few:

Speed at impact? First they look for the impact marks, on a shim plate within each propeller hub, of the gear teeth at the butt of each blade. That gives blade pitch at impact. Then they study the governor setting in the hub, which supplies r.p.m. Finally, they measure the distance between successive slash marks made by the blades along the ground. Read together, these clues tell not only speed at impact, but how much power each engine was developing, and what steps the pilot had taken at the time of the crash.

Fire aloft? It is seldom difficult to distinguish between fire in flight and that resulting from a crash. A substantial fire aloft almost always leaves deposits back along the flight path. Driblets of metal are analyzed: If they are magnesium, they probably came from an engine's accessory section; if they are dural, they

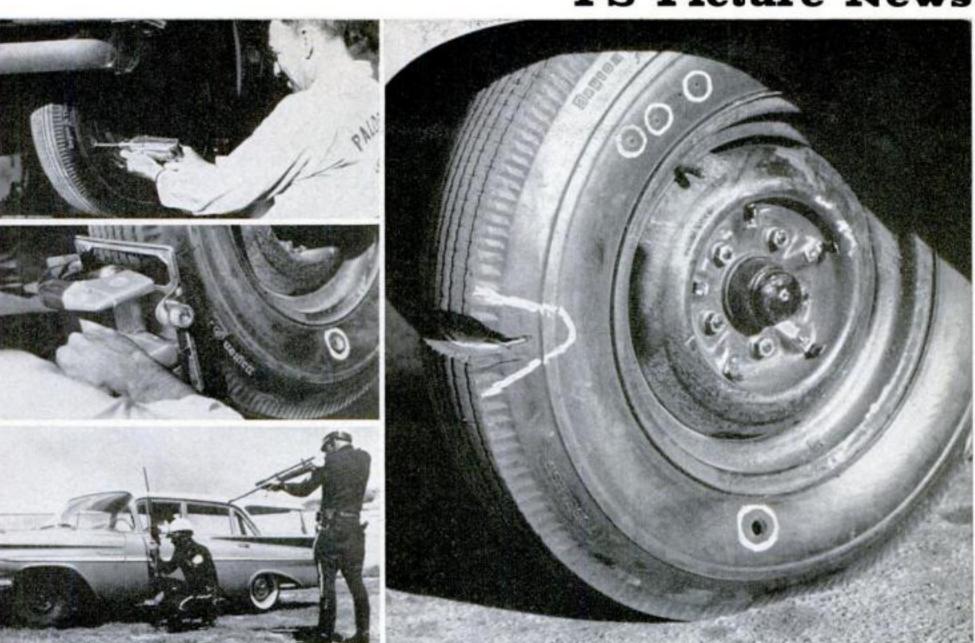
are probably from airframe or skin. Even a single popped rivet can tell a story, because different kinds of rivets are used in different parts of a plane. Impact fire can be distinguished by ground blackening and other characteristic patterns.

Reading metal. The story of most plane crashes is pieced together from shards of plane that are collected and studied with the patience of Job.

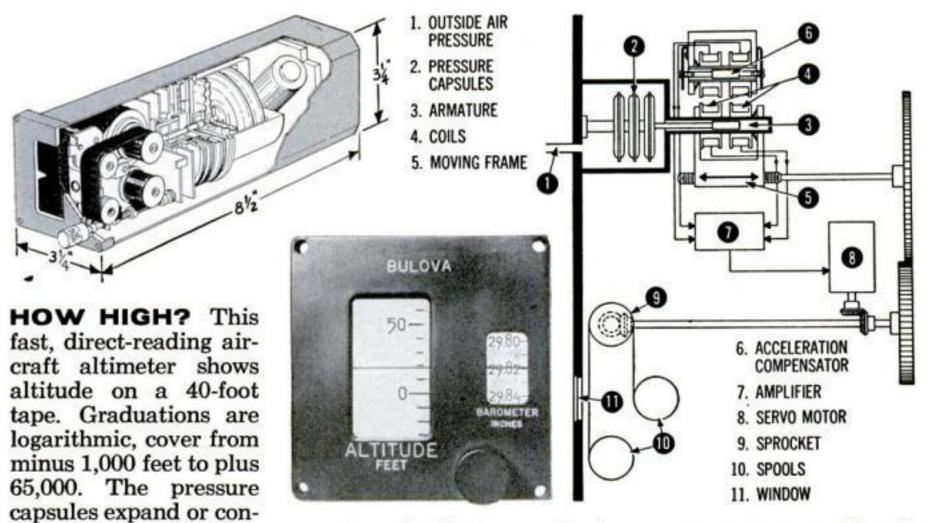
Microscopic or X-ray analysis of a part that has failed will often reveal a clue. "Cross-graining" at or near a failure, particularly in a forging, suggests a fatigue cause. Manufacturing flaws—tool marks or even scratches—may show up in meticulous examination. Micrometer measurements of bolt lengths, and study of thread distortion, may point to a faulty torque wrench-or mechanic. Analysis can often even introduce a time factor. Metals rubbing together can develop a high polish; microscopic examination of the depth of scratches in this bright spot can tell how long the rubbing went on.

Such is the nature of the "horse sense" used in determining crash causes.

PS Picture News



TORTURE-PROOF TIRE. Filled with polyurethane foam instead of air, this experimental tire can't blow out or go flat. Pictures above show how tough it is, as it's cut into, drilled, sawed through, and shot at with a rifle. Dayton Rubber Co., its developer, says it rides softer and is more stable than pneumatic tires. It may be on the market within a year.



tract to move a soft-iron armature inside two coils for a correct tape reading in the window. The device is said to be 10 times more accurate than older altimeters using pointers and a dial. Bulova is making an initial 25 for Air Force testing.

What's Coming in

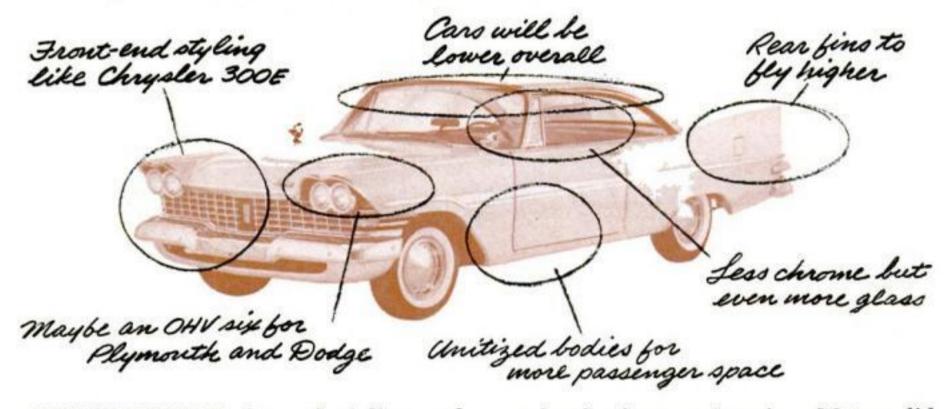
Big Three expect improved full-size cars to outsell smaller ones, foreign and domestic, by at least two to one

By Ken Fermoyle

DETROIT is still in the big-car business! Compact-car plans have hogged the spotlight so much recently this has all but been forgotten.

There won't be any gas-turbine engines, aluminum V-8s, radar-operated brakes, all-glass roofs or similar radical features for 1960, but there will be plenty

Chrysler plans big switch



COMPLETELY changed styling and unitized bodies are planned for all Chrysler lines in 1960. A major reason for switching to frameless construction: It permits an increase in usable interior space.

Styling will be keyed to current 300E models up front, with modifications of the fins—changed in shape, but not emphasized to a much greater degree—flying high at rear. Chrome will be used less lavishly than on some of the present models. Glass areas, already huge, will be increased. Doors will extend further into roof panels to ease the acrobatics of entry and exit.

A new six-cylinder engine might replace the dated L-head six now used by Plymouth and Dodge. Sixes have made a sales comeback in the past year, and Chrysler is the only one of the Big Three without an overhead-valve six—a real marketing handicap.

Some reports indicate the company might just convert the present engine to overhead valves, as American Motors did with its small flathead six several years ago. Another possibility would be an enlarged version of the new engine designed for the compact cars.

There will be few changes in V-8s since Chrysler introduced a whole range of V-8s just in the last two years. There are rumors, however, that engineers are readying an easier-to-service distributor and a smaller, lighter generator.

Changing to unitized bodies means some reworking of suspensions. But the basic layout—torsion bars up front and wide-spread leaf springs at rear—will be the same. Chrysler has had great success with this system, and sees no reason to change.

The new construction method involves building the body minus roof panel and doors, and then installing interior trim. After roof and doors are in place, a stub frame section with the engine and front suspension will be attached to the body proper.

76 POPULAR SCIENCE JULY 1959

1960's Full-Size Cars

of full-size automobiles—and Detroit confidently expects them to outsell upstart smaller cars, foreign and domestic, by at least two to one.

Here are some of the things 1960 will bring:

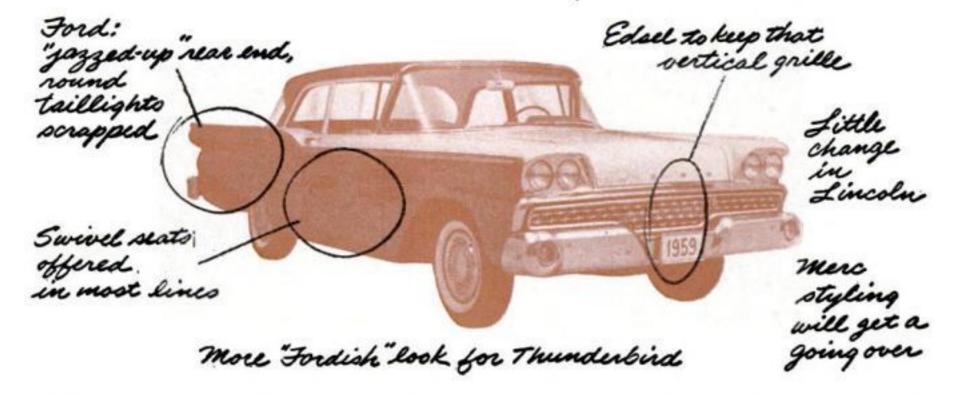
 Engineering improvements, which will be important but not revolutionary. Styling changes—ranging from slight to significant—across the board.

New production techniques.

 Spreading to more models of features that have seen only limited use in the past few years.

That's it in a nutshell; here's how it breaks down by corporate families:

Ford will be less conservative



FLAT roofs and rather angular lines will be continued. "We've added a lot of jazz to the rear end," reports one Ford man.

Rear fenders will be topped by canted blades flaring out from a flat and slightly lowered rear deck. Round tail lights, which symbolized Ford from 1952-57, were dropped in 1958, revived for 1959, and will be scrapped again—in favor of a design that blends better with new rear styling.

Edsels definitely will be continued, at least through the 1960 model year. They will continue to share a body shell with Ford, with different front-end treatment and different rear fenders and deck lid. Vertical grilles will again be used.

Mercury will retain its own distinctive body shell. Stylists have concentrated on cleaning up appearance problems created by grafting a rounded greenhouse, or upper structure, on a boxy, crisply angled lower body.

Unitized construction of Lincolns and

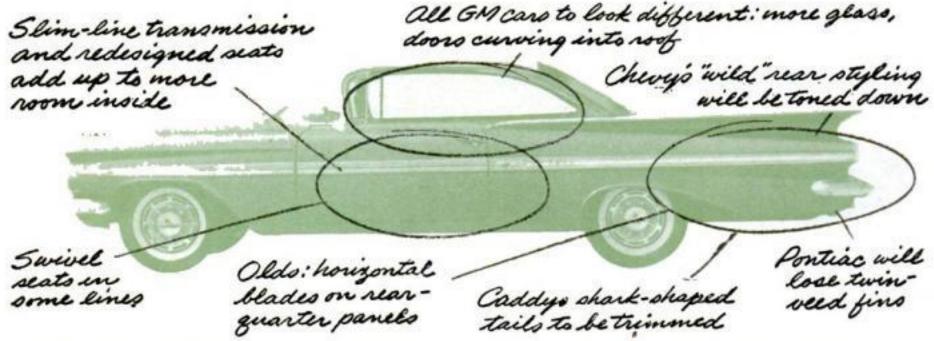
Thunderbirds will continue, with both cars receiving face lifts for 1960. Changes in Lincolns won't be great, although heavily sculptured areas around the wheels will be restyled to give a cleaner, crisper look. Other sheet-metal changes may reduce length slightly, but wheelbase will stay the same. Thunderbirds are so popular now that major changes are believed unnecessary, but the rear end will be remodeled slightly to give it a family resemblance to new Fords.

Engine lineup will remain about the same as in 1959, except for the inevitable juggling of displacements, compression ratios and camshafts. Even this tinkering will be minimal because horsepower ratings will change very little. Ford has some interesting projects in the works, including aluminum engines and positive, mechanically actuated valves, but these are still in the future.

Swivel seats will be offered in most, if not all, Ford lines. Electroluminescent instrument panel lights were considered for some higher-priced models but ruled out for 1960. However, other makers may use this system.

It's a type of lighting that does away with bulbs and individual wires, and works by sending current through two conducting surfaces with a layer of phosphor sandwiched between them. It gives a soft, attractive light that makes it easy to read instruments, reduces eye strain.

GM plans more room inside



A^{LL} General Motors cars will have more interior space. Floor pans will be lowered and seats redesigned to provide more headroom and legroom, but exterior dimensions won't change much.

Transaxles — automatic transmissions mounted in the rear in combination with differentials—aren't ready yet. But a new "slim profile" three-speed Hydra-Matic will be introduced. Its smaller size and other driveline modifications will permit reductions in drive-tunnel heights. (Contrary to some reports, this is not the transmission that will be mounted in the rear when transaxles are introduced—probably in 1961.)

There will be noticeable appearance changes in all GM lines through use of new exterior sheet metal. Underbody structures, except for floor pans, will stay the same.

Chevrolet's wild rear-fender styling will be toned down slightly. The airfoillike blades will be redesigned. Olds is expected to have horizontal blades on its rear-quarter panels. Pontiac will change the twin "Veed" fins it now has. Cadillac's shark-shaped tails will be clipped.

Even more glass will glisten on most models. Larger rear windows will extend further into the deck area.

Swivel front seats will be offered by several GM divisions as a partial answer to the exit-entry problem. Doors on some cars may curve into the roof panel.

Except for the Corvair's pancake six, no new engines are likely this year. But aluminum V-8s aren't too far off. Chevrolet is working on such an engine for its standard-size cars and development is underway on two small V-8s (one displacing about 180 cubic inches, the other about 230) for compact cars underway.

Cadillac may use electroluminescent instrument-panel light. There are also rumors that Cadillac and one other line will adopt finned aluminum brake drums with cast-iron liners like Buick's. All-aluminum wheels and bumpers are long-shot possibilities for expensive models.

American, Studebaker Gird for Battle

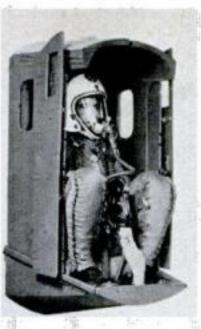
THERE'S a happy situation at American Motors where George Romney's crew has been planning a major styling change. This will furnish ammunition to

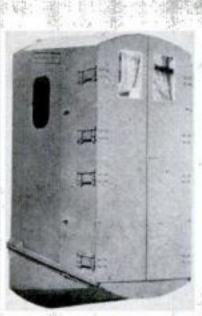
meet compact-car competition from the Big Three. Only the small American models will stand pat.

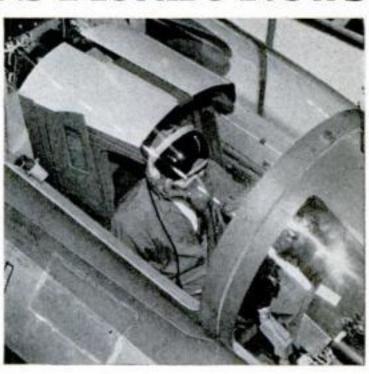
[Continued on page 218]

PS Picture News









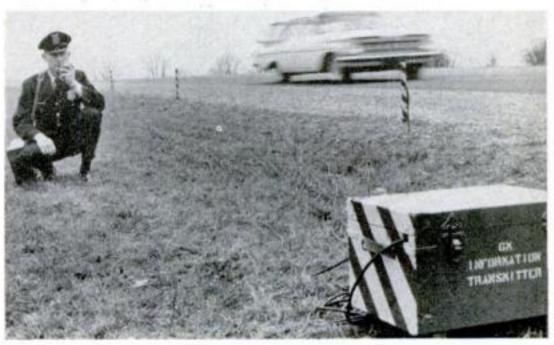
by Republic to shoot a pilot safely from a jet traveling two to three times as fast as sound. Photos show it first as a normal seat. Then a pull on a handle works device that presses pilot's arms and legs into place, closes doors. At far right, seat is shown in cockpit mock-up.

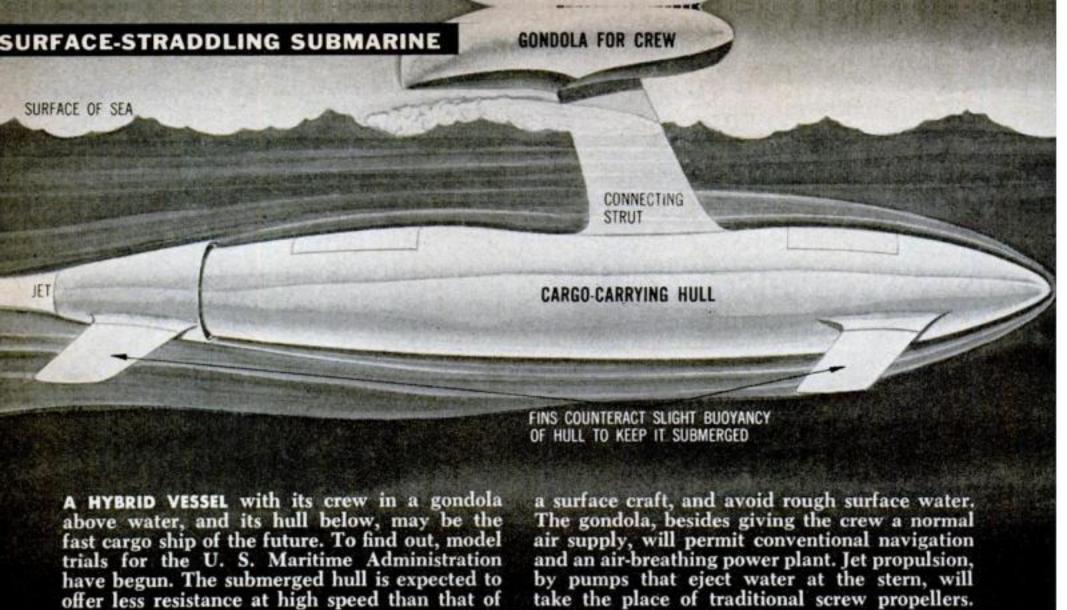




ROCKET BOAT. A new water-jet engine is expected by Aerojet-General, makers of rockets, to give new high speeds to military, racing and pleasure craft. The low-powered version above tried out in a test basin (left) reached 22 m.p.h. It's run by an impeller on the shaft pumping water up and out through nozzles in a whirling spray (arrows at right).

ROADSIDE RADIO. The experimental radio system at right was developed by GM to broadcast warning messages to moving cars. Taped messages can be put in the transmitter (far right) and sent out through roadside antennas. The warning is received either by separate unit or an adapter that mutes the car radio and puts its low-frequency message on the loudspeaker. If the radio is off, a warning signal tells a driver to turn it on.

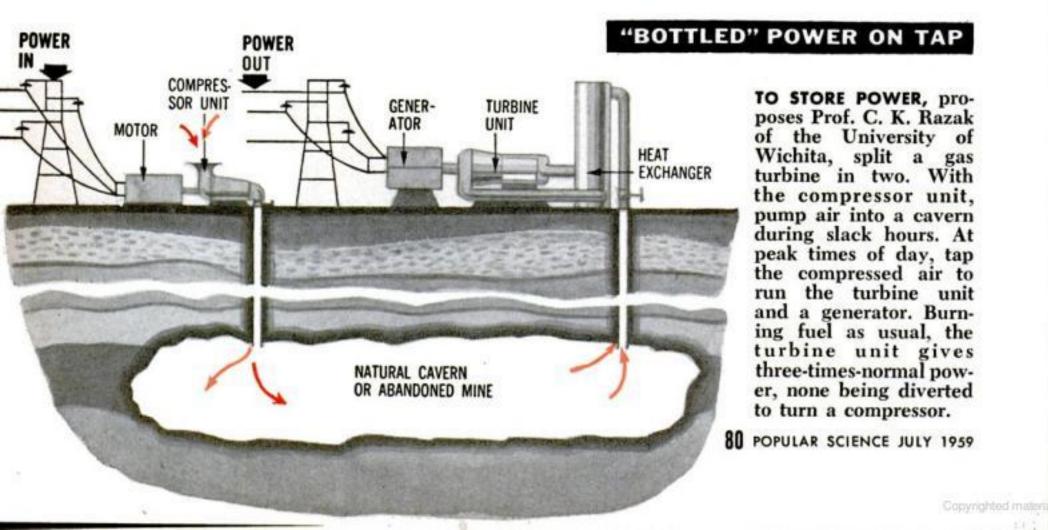


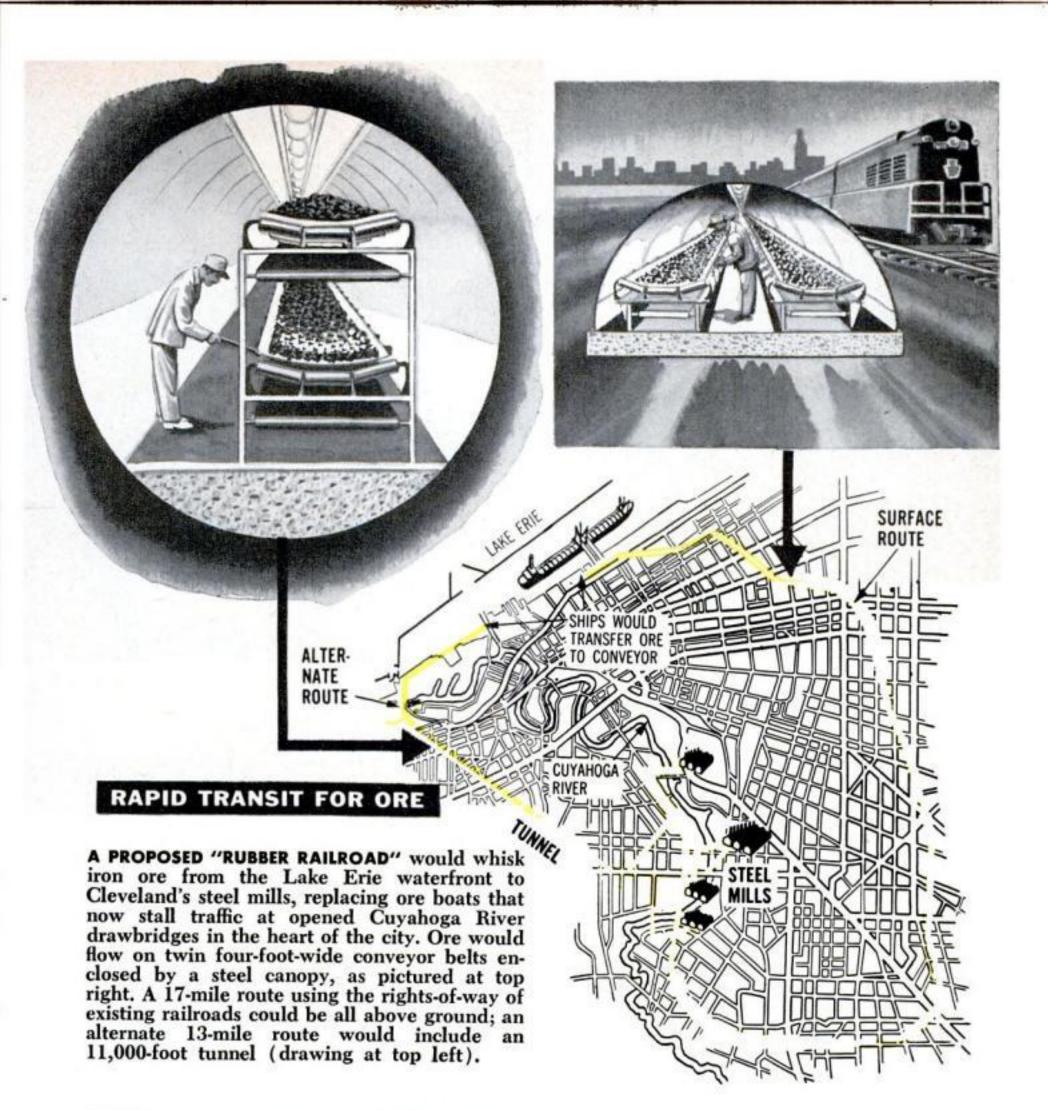


What the Engineers Are Dreaming Up

HEY'RE cooking up new surprises for us, in U. S. engineering and research centers. Projected schemes include a submarine that swims half out of water; a way to bottle and store power underground; an urban rapid-transit line

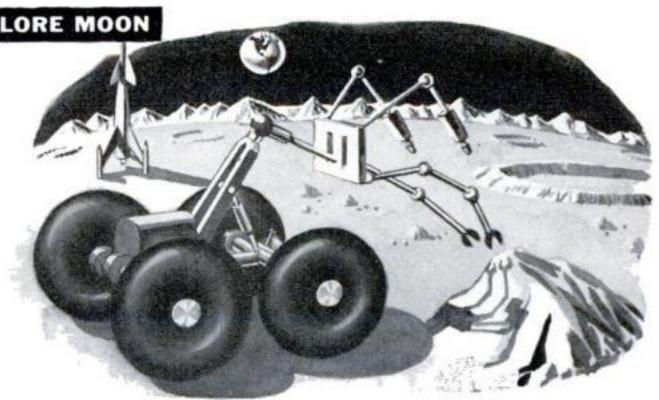
for ore; a moon-exploring machine; and a novel reciprocating engine driven by atomic energy. While the five ideas pictured here exist only on paper so far, at least some have a good chance of reaching practical form before long.

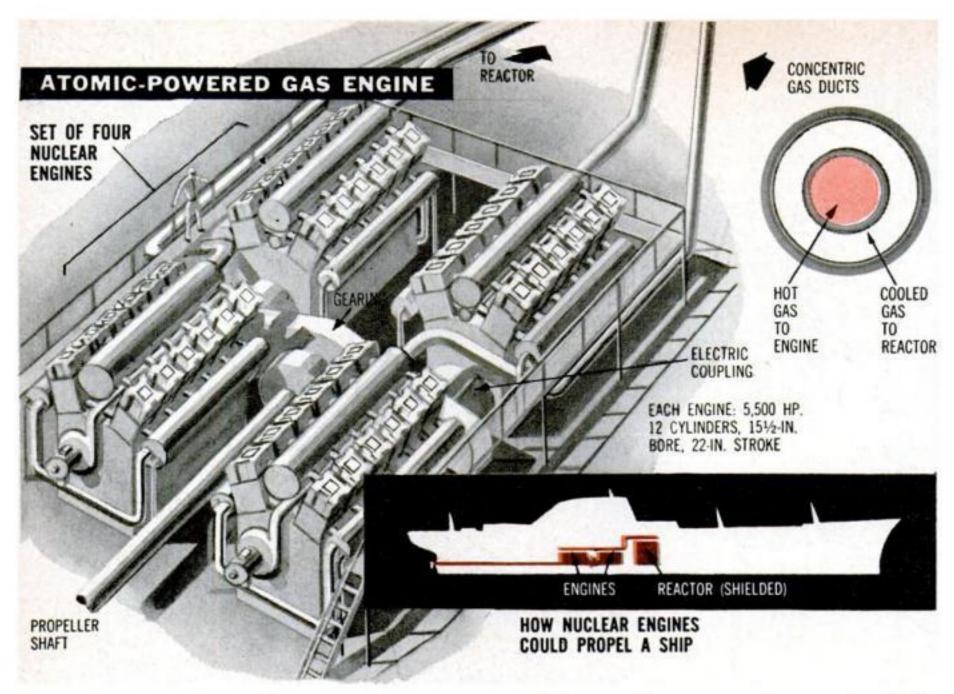




MACHINE TO EXPLORE MOON

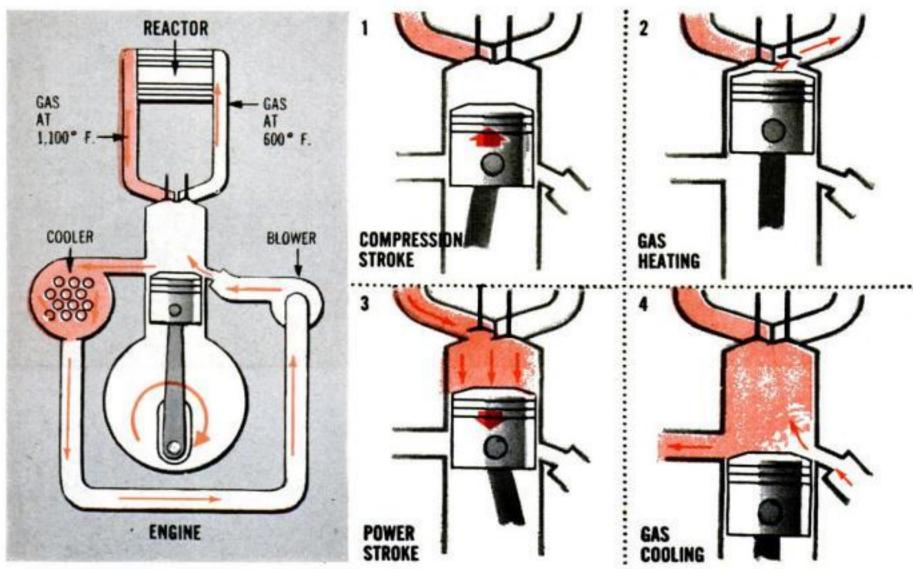
FIRST EXPLORER of the moon may be a machine. Roaming the crust, it would collect samples of rocks and dust with mechanical fingers, under remote control of spacemen remaining safely within a landed rocket ship. Hughes Aircraft Company designers say it could be patterned closely after their Mobot, a mobile mechanical manipulator whose dexterity inspired the idea.



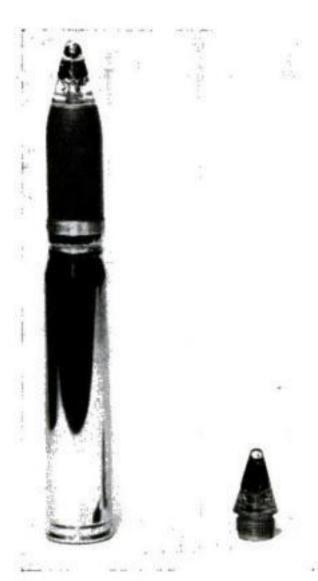


A NUCLEAR GAS ENGINE offers a promising new way to apply A-power, reports A. P. Fraas of Oak Ridge National Laboratory. By delivering pure nitrogen gas at 1,100 degrees F. and 100-atmosphere pressure, a reactor would directly run a reciprocating engine of his design. In turn, the hot gas drives a piston, and is cooled, recompressed and reheated as shown below. A

set of four nuclear gas engines, each of 12 cylinders and 5,500-hp., could propel a 20,000-ton merchant ship as above. They would short-cut the indirect procedure of making steam to run a turbine, and should apply a reactor's limited temperature more efficiently. Low in radioactivity, they could safely be approached and tended while in full operation.



PS Picture News



transmitter in the nose cone of an artillery shell radios in-flight shell temperatures to ground receivers for Army ballistic studies. Shown here is a radio nose cone on a 20-mm. rapid-fire antiaircraft shell. Beside it, next to a one-inch rule, is the standard steel fused nose it replaces for tests.



SNAKE SOUNDS. The peculiar hissing noise a cobra makes before it strikes is recorded above by William E. Haast, Florida snake expert. He expects to distribute recordings to jungle explorers and hikers.



FRENCH DOME CAR. Self-propelled panoramic cars are operated by the French National Railroads for Riviera and Alps tourists. They are built by Renault, carry 66, are run by a soundproofed midsection diesel.



HOSE SEEDER. Grass seed is mixed right with the water by workers planting cloverleafs and embankments along Colorado's new highways. The water in the tank truck at left is loaded with 40 pounds of seed, enough for two acres. Five fillings is a day's work.

BOG TRACTOR. Wide double tracks on this big Canadian vehicle negotiate soft muskeg country north of Calgary. The unit, built by Bruce Nodwell, Ltd., hauls 10 tons of oil rigging with pressure of two pounds per inch spread over a trackage of 28,000 square inches.





The Giant That Fooled the World

. . . the incredible tale of history's weirdest hoax

THEN George Hull left his weed-choked, debtridden tobacco farm outside Binghamton, N. Y., and headed west in 1868 to seek better fortune, he thought maybe he'd go prospecting for gold. But he never reached gold country. On the way, 90 years ago, he stumbled on something more precious than the yellow metal: human gullibility.

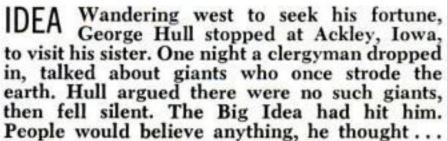
The result was one of the most successful scientific hoaxes in history. On a total investment that probably didn't top \$4,000, Hull netted a profit estimated at \$30,000 to \$60,000—a small for-

tune in those days.

Hull's hoax was the famous Cardiff Giant—a 12-foot statue of a man, secretly made, secretly buried, and then "discovered. Hull had a fabulous double-barreled lie to go with it: It was either a petrified man or an ancient statue-take your choice. Not only the general public, but many learned men, paid to see it and swallowed it whole.

These pictures show how Hull executed his monumental deception.—Max Gunther.



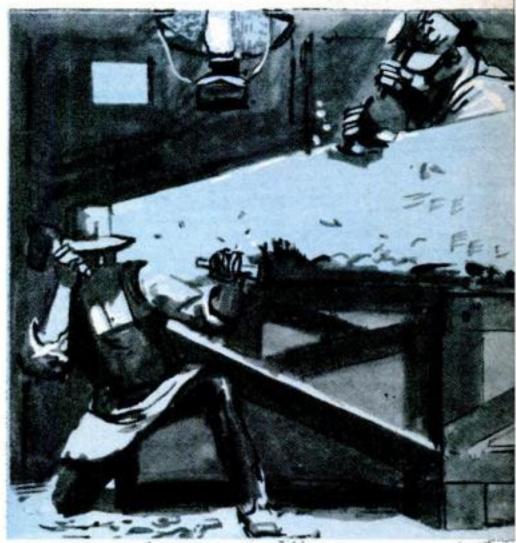




RAW MATERIAL Hull had heard of petrified trees. Why not a petrified man—a giant, aged to stone in his tomb? Near an Iowa railroad construction site, he found beds of gypsum, a soft limy rock. He paid a grading crew one keg of beer to quarry out a mammoth 12-by-4-by-2-foot block.



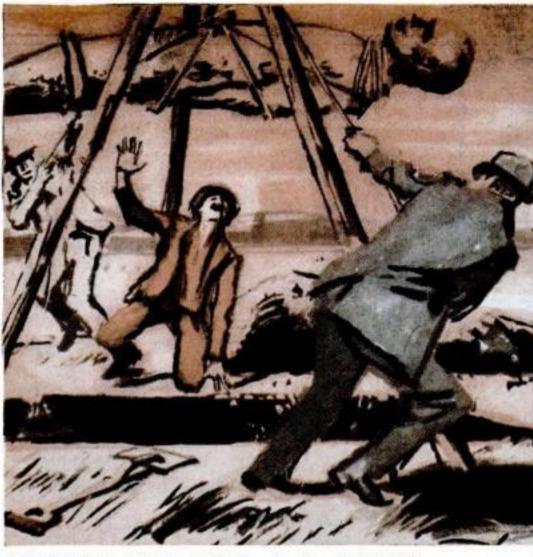
TRANSPORT The block weighed some three tons. Hull had it wrapped in canvas and hoisted onto a dray. It took three weeks to move it 40 miles to the nearest railhead. Two wagons and a bridge broke under the weight. Hull cut off a ton, told bystanders the stone was for a monument.



SCULPTURE Hull confided his scheme to Chicago stonecutter Edward Burkhardt, had the block hauled into an empty barn Burkhardt owned. With two assistants, Burkhardt began hacking the gypsum into the figure of a 12-foot-tall man who had died in agony. The face was a likeness of Hull's.



FINISHING TOUCHES To simulate pores in the giant's skin, Hull made special hammers by setting needles in lead bases. To make him look antique, the stonecutters rubbed him with sand, water, ink, and sulfuric acid. By unexpected luck, veinlike lines appeared in the gypsum.



SETTING THE BAIT In Cardiff, N. Y., a relative of Hull's, William Newell, had a farm. For a fourth interest, he agreed to have the giant buried there. In November, 1868, Hull, Newell and two friends lowered the 2,990-pound colossus into his tomb, carefully filled it over.



IN THE MONEY Huge crowds came to see the giant. Newell fenced off the area, hired a barker, charged 50¢ admission. Hull refused one \$10,000 offer for his "find," finally sold a part interest to Syracuse businessmen for \$30,000. The giant was exhibited in Boston and elsewhere.



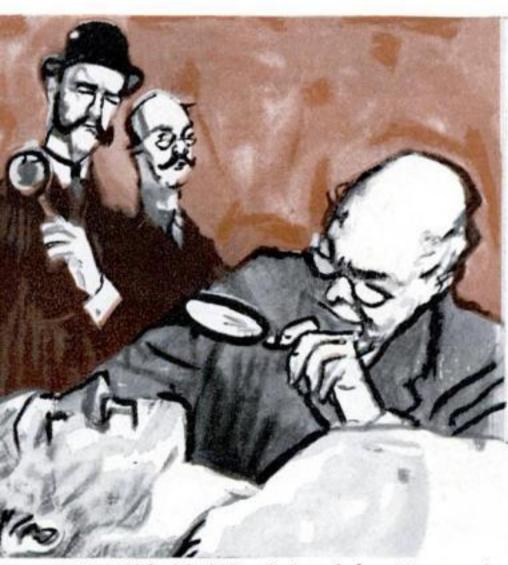
TROUBLE BEGINS Showman Phineas T. Barnum offered a huge sum, reportedly over \$50,000, for a share. Newell turned him down. Barnum then had his own giant made of papier-mache, exhibited it in New York, offered a \$1,000 reward to anyone who proved his less genuine than Hull's.



SPRINGING THE TRAP Hull waited a year until all talk of his mysterious wagon cargo was forgotten. Then, in October, 1869, Newell hired two neighbors to help him dig a well—pointing out just where they should start. The point of a shovel hit something. The hoax was on.



LAST HURDLE Hull's one worry was that scientists would spot the hoax, but to his delight they were awestruck. They came from universities and museums far and wide. They didn't go for the "petrified man," but called the giant an ancient statue. Hull told Newell to bill it as such to the public.



THE JIG IS UP Stirred by Barnum's spoof, scholars examined the giant more closely early in 1870. Prof. O. C. Marsh of Yale noticed crevices ink and sulfuric acid hadn't reached, fresh tool marks near worn surfaces. The Iowa rail crew remembered quarrying the gypsum block for Hull.



THE END Hull finally sold his giant to a carnival. He was a rich man. But by 1873 he was flat broke again, a result of bad investments. He tried to repeat his great hoax with another giant "discovered" in Colorado, but this second hoax never got off the ground. Hull went to England . . . and oblivion.



NEW-STAR GAZING is the job of girl inspectors at the New Jersey plant of Annin & Co., one of the largest makers of flags.



1. STAR-MAKER MACHINE cuts five-pointers of varying sizes for big and little flags. Most popular is three by five feet; big ones run way up to 60 by 90 feet.

Our Flag Gets a New Star

BETSY ROSS would be a busy girl if she were alive today—sewing new stars on our flag.

On July 4th, the 49-star flag becomes official, marking the admission to the Union of Alaska—the first addition since

1912, when New Mexico and Arizona brought the total of stars to 48. The new flag has seven staggered rows of seven stars instead of six of eight.

Crowding the blue field a bit more, a 50th star, for Hawaii, is expected to be-



OD POPULAR SCIENCE JULY 1959

TINY RACERS.

Junior speedsters that will do 35 m.p.h. on a 2.85-hp. gasoline engine are shown at left being driven into an air-cargo plane by pint-size drivers. The maker, Larc-Douglas Co., Great Neck, N.Y., uses planes to speed delivery of the cars, shipped ready to drive, all over the U. S. Midget design copies big racing cars.

2. PLACING STARS accurately is a must. A master template is placed over the flag material, and glue is dabbed in through star-shaped openings.

PS Picture News



4. STRIPES REMAIN THE SAME, though new star is added. Here automatic seamer is used to join red and white.



3. TEMPLATE IS REMOVED and the cut-out stars placed on 49-pattern glue spots. The stars are then sewn in place.

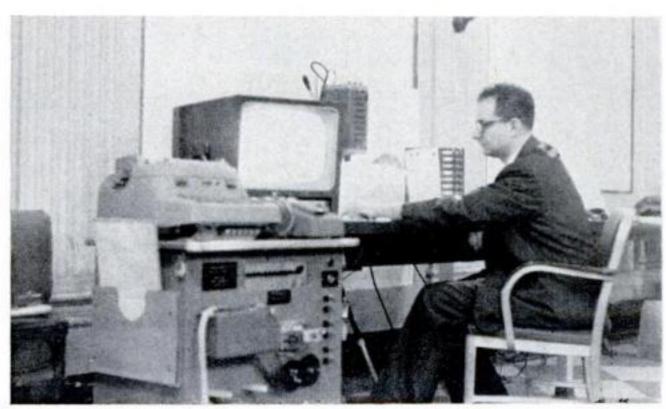
come official on July 4th, 1960. Although no design has been approved as yet, or will be, probably, for quite a while, one suggested arrangement, endorsed by the U.S. Flag Foundation, is five rows of six stars and four of five stars.



5. STARS AND STRIPES MEET to make our new Alaska-welcome flag. Next year: Aloha, Hawaii.

ROBOT TUTOR.

A teaching machine is making life easier for physics, electronics and mathematics instructors at New York Institute of Technology. It plays recordings and closed-circuit TV film, answers a student's questions, and then, as at right, tests him, correcting his errors and scoring him. Poor students are even reprimanded.



Can We Vacuum-Clean the Sea Floor for Valuable Ore?

By Roscoe and W. N. Fleming

Soon we may sweep the sea floor for strategic and valuable minerals. At least 14½ million square miles of ocean bottom, recent discoveries show, are strewn with nuggets of them. Typically shaped like potatoes, sized from a pigeon's egg to a football, these brown and black lumps of light porous rock are called manganese nodules.

How valuable is the ore? The lumps of rock average 20 percent manganese, 15 percent iron, half a percent apiece cobalt, nickel and copper. Many are even richer. The nodules within a single square mile hold \$500,000 worth of metals. And it's feasible to "mine" the sea for them, with

techniques now available, reports John L. Mero of the University of California's Institute of Marine Resources.

Discovery of minable quantities of the nodules was a surprise of the recent International Geophysical Year. Specimens have been dredged up since the 1870s, but their abundance was unknown until a 1957-58 cruise by the research ships Horizon and Baird, of the Scripps Institution of Oceanography at La Jolla, Cal., found a great South Pacific area covered with them. As other ships extended the finds, Mero was assigned to study whether they could be commercially exploited.

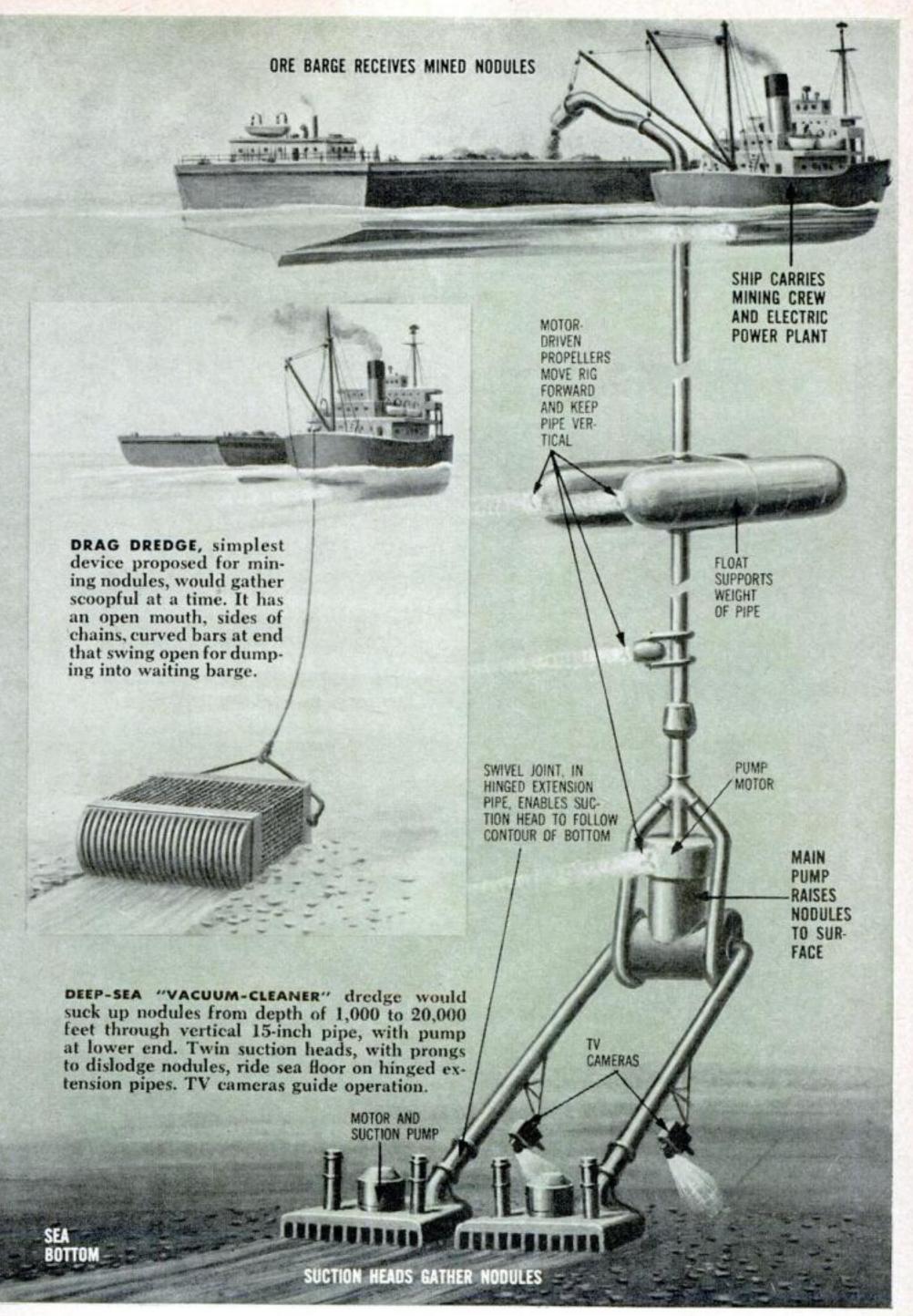
The nodules resemble no other known manganese or iron mineral. Cross-sec-

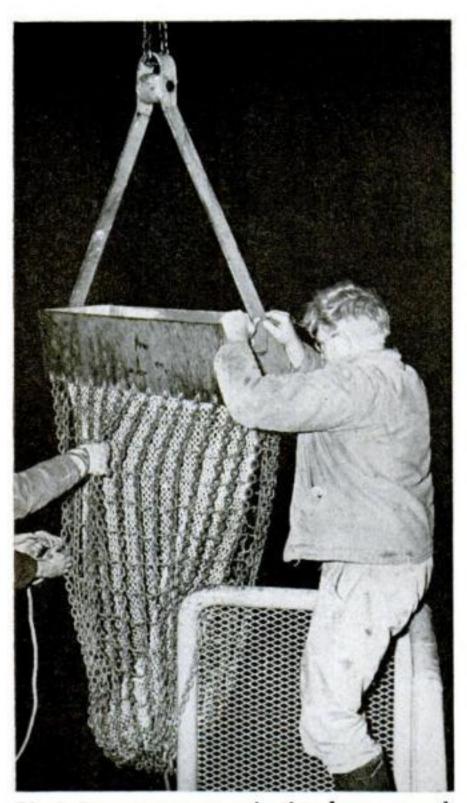


SEA-MINING PLANNER John L. Mero, in University of California lab where he made his study, exhibits specimens of nodules from floor of South Pacific near Tahiti.

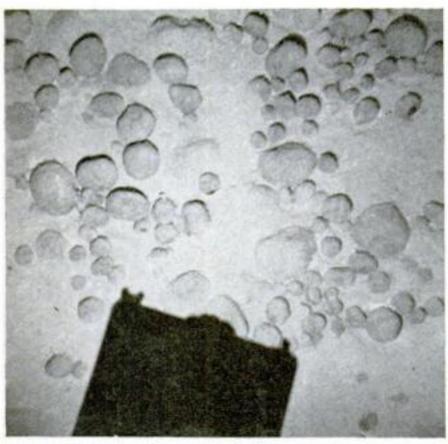


BIGGEST MANGANESE NODULE brought up so far is 125-pounder, 25 inches long, being measured here. It was recovered in 1951 by ship Horizon, of Scripps Institution of Oceanography, north of Hawaii.





TO GATHER NODULES, scientists lower a rock dredge from research vessel Horizon. Proposed drag dredge for mining nodules would be large-scale version of this scientific implement.



MANGANESE NODULES on Atlantic floor, 18,000 feet down, are viewed by camera. Its shadow is at bottom of this striking photo by David Owens of Woods Hole Oceanographic Institution.

ers like an onion's, often built up with a shark's tooth, a whale's earbone, or a lump of clay as a nucleus—at an estimated growth rate of about 1/100 of an inch every 2,500 years. Their content of manganese, which is oxidized, mysteriously exceeds that of sea water by 10,000,000 times. Possibly living organisms concentrated it. By another theory, objects protruding above the sea floor were made battery-like electrodes, by sea-bottom currents in the earth's magnetic field, and metals plated upon them.

Laboratory tests by Mero show the nodules make excellent ore. Dried, they can be crushed even in the hand. They're amenable to present ways of extracting manganese and would yield a ton, worth \$43, at a total cost of \$25 to \$35 for mining, transportation and processing. Their prized cobalt and nickel, also recoverable, promise added return.

How can they be harvested? Simplest of several ways proposed by Mero is by drag dredging. Towed slowly along the ocean floor, an open boxlike scoop would fill with nodules. Then it would be raised, emptied and returned for another haul. This would be practical at the moderate depth of a reported field of nodules in the Atlantic off Florida, only 500 to 3,000 feet deep; and at another field of 3,800-foot depth at Tuamotu Ridge in the South Pacific.

Deeper nodules call for hydraulic dredging. Vast Pacific beds three miles down inspire Mero's most radical plan:

A huge barge would lower a pipe like oil-well casing but at least 15 inches in diameter. Motors attached at intervals, and controlled by gyroscopes, keep it vertical. At its lower end, extension pipes with suction heads snuff up nodules, to be pumped up the pipe to the barge. The crew would turn on the suction, and the rig would then move slowly about, like a housewife vacuum-cleaning a rug.

Such an operation must be on a grand scale. Lower limit would be a \$10,000,000 outfit, able to recover 500 tons of nodules daily. A 5,000-ton-a-day dredging rig might cost \$60,000,000.

Mining the more easily accessible nodules may be under way sooner. Where they lie within 4,000 feet of the surface, Mero declares, "a commercial venture may now be possible."

New Ideas from the Inventors

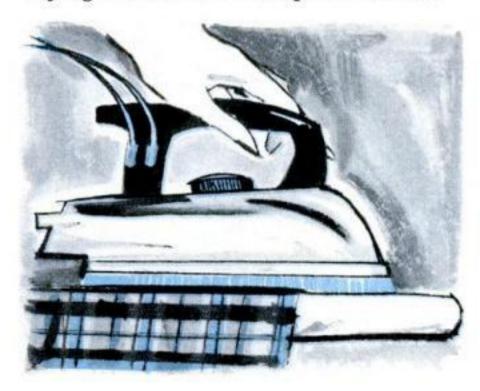


Bumper Trunk Doubles as Bed. This recently patented camp-out bed would be partly formed by-and partly carried inside—a folding trunk designed to ride

on the rear bumper of a car. The bed and its collapsible canopy could be set up separately or, as shown, with one end supported by the bumper.

7 Air Cushion Floats Iron. A woman might whiz through her pressing faster and with less effort if her iron came with a small compressor. Valving heated air through the soleplate would float the iron, make it more maneuverable, speed drying of steamed or dampened fabrics.

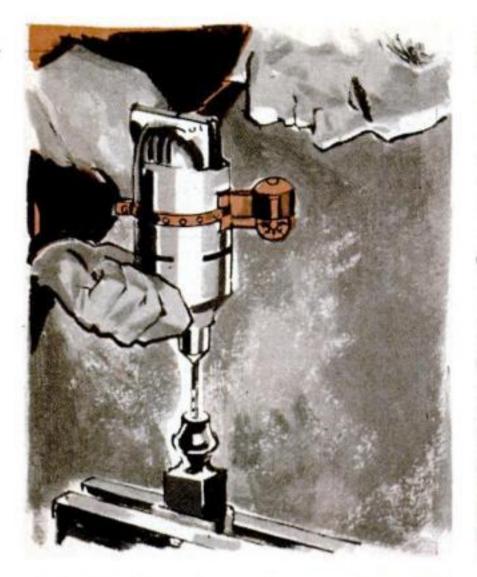
Q Magnets Help Wiper Wipe. You could get a car cleaner in less time if you used a pad or mitt like this. Stitchedin magnets would keep the pad in snug, sliding contact with metal surfaces so you could wash or polish the car with longer, easier, no-skip strokes.

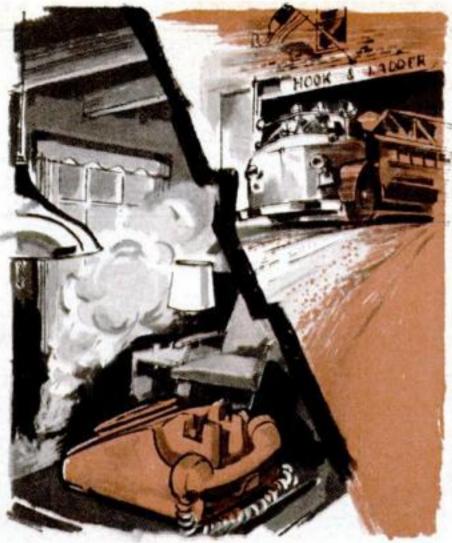




CONTINUED

Copyrighted material



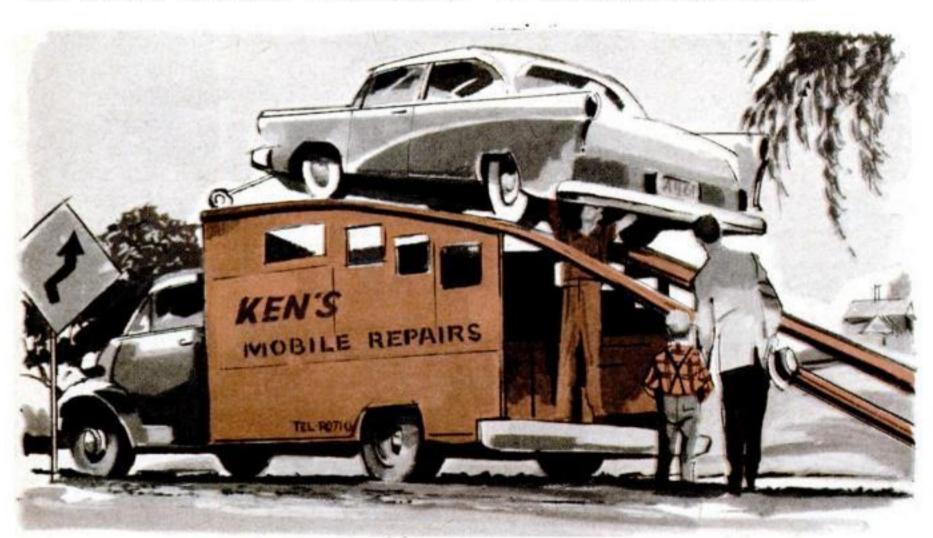


4 Bubble Levels or Angles Drill. This spirit-level attachment would add some of the precision of a drill press to the convenience of a portable electric drill. You could set it to any angle, and you'd know you were boring on-course as long as the bubble remained centered.

6 Service Pit Drives to Car. With this mobile repair truck and service pit, a mechanic could provide most regular station services as well as on-the-spot re-

5 Alarm Phones for Help. Installed between conventional burglar or fire detectors and your regular telephone, this automatic alarm relay would react to an emergency by dialing a prearranged number and summoning help by means of a coded or prerecorded message.

pairs. Ramp extensions would let down to ground level so a winch, powered by the truck's engine, could draw a disabled car onto the overhead tracks.

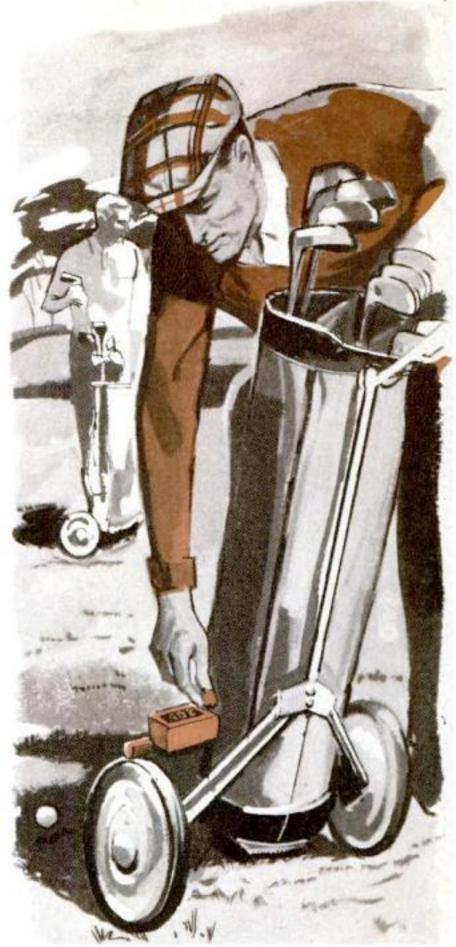




7 Timer Tells Who Drew First. Play fights mightn't end up as real fights quite so often if young cowboys shot it out with these toy pistols. A timer on each one would measure the interval between drawing and firing, which should settle all, or most, or a few arguments.

8 Door Handle Lights Lock. Part of this car-door handle would be made of translucent plastic to enclose and protect a small bulb, and focus its rays through openings at bottom, front and rear. Controlled from the dashboard as well as from outside switches, the lock illuminators would double as running or parking lights by defining a car's width.





9 Golf Cart Measures Drive. As a golfer wheeled this club carrier from the tee to the green, a yardage indicator would give him an accurate measure of his drive. By subtraction he could get a good idea of the remaining distance to the hole, which should help him select the right club for the next stroke.

The following patents have been issued on these inventions: I. Patent No. 2,759,199 to J. H. Wollam, Toledo, Ohio; 2. No. 2,864,185 to J. E. Vance, Canton, Ohio; 3. No. 2,827,651 to J. V. Rizk, Gainesville, Fla.; 4. No. 2,757,458 to F. S. Zipser, Red Hook, N. Y.; 5. No. 2,866,850 to F. J. Duca and W. E. Phipps, Mobile, Ala.; 6. No. 2,765,938 to P. D. Di Addezio, Hayward, Cal.; 7. No. 2,869,873 to F. S. Tornabene, Douglaston, N. Y.; 8. No. 2,760,050 to F. A. E. Porsche, Stuttgart, Germany; 9. No. 2,766,935 to S. M. Klein, Chicago.

Copies of patents may be ordered, by number, from the Commissioner of Patents, Washington 25, D. C., at 25 cents each. To write to an inventor, if the address given above is insufficient, you may address him (by name and patent number) in care of the Commissioner of Patents.

Rocket 'Shovel' Digs Foxhole

ANYONE who has ever dug a foxhole will appreciate what the Army is doing to take the sweat out of a backbreaking chore that still lingers unpleasantly in the memories of ex-GIs.

An explosive foxhole digger has been developed. The soldier sets it up on its tripod, and pulls a couple of pins to set off a series of explosions, including a downward-firing rocket. A delay fuse gives him 56 seconds to get away to a safe distance of 20 yards.

The explosions do not give him a completed hole, but the spadework with his field intrenching tool is like digging in a deeply plowed garden plot. If he makes the dirt fly, he can have cover in four minutes. With his poncho spread on top, he probably would have protection from the effects of a small atomic weapon, if he were not too close to the blast.

The foxhole digger shown here is admittedly experimental. A better one is in the hopper.





OPERATION of the digger is simple, needing only 30 minutes' instruction to train an inexperienced man. Mounting it on its tripod, he pulls a lower pin, arming a shaped charge.



we and with a substitution of the substitution of

changing hand positions, he pulls the lighter of a 56second-delay safety fuse. This will ignite a downwardfiring rocket, detonating the digger's shaped charge.



WALKING AWAY is important, as a runner might stumble. When the device goes off, the shaped charge makes a pilot hole, and vanes catching in sides set off cratering charge.



Dirt and debris fly high when foxhole digger blasts off with half a pound of high explosive.



Four-minute foxhole. Hand-dug, it would take a half-hour.



is indicated by this twisted piece of metal found embedded in the hole. The device is safe enough, however, to be dropped with a paratrooper.



BIPLANE. A throw-back to World War I, the aircraft at left is a new Ag-Cat. It's designed by Grumman for crop dusting. Maximum wing area and a minimum wing span permit a continuous turn at low spraying speed. Stall speed is a slow 42 m.p.h.





Navy frogmen wearing aqualungs ate from squeeze bottles (left), played magnetic checkers (above) as they set an endurance record in a Norfolk Naval Base pool. They stayed underwater for 48 hours.

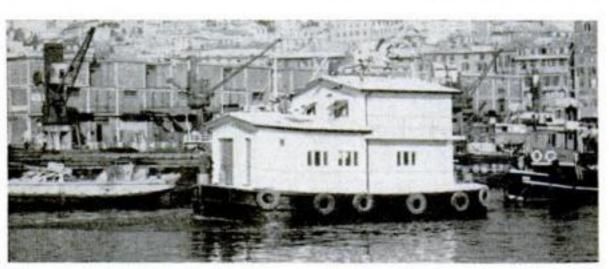


one of the world's smallest precision drills. It measures .0135 inch in diameter, just four times as thick as a hair, and is twice as long as a dime is wide. It's made by Super Tool Co., Detroit, of cemented carbide, puts hundreds of unvarying holes in metals or plastic.

CROP ROTATION.

Citrus seedlings spin on a merry-go-round at right to help University of California chemists find the best iron ration for maximum fruit production. The turntable, adapted from a playground ride, rotates 15 times an hour to expose all plants to the same sunlight.



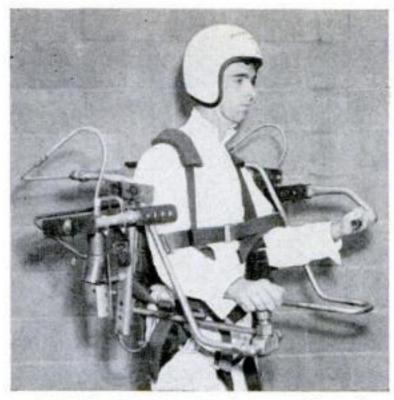


FLOATING HOUSE.

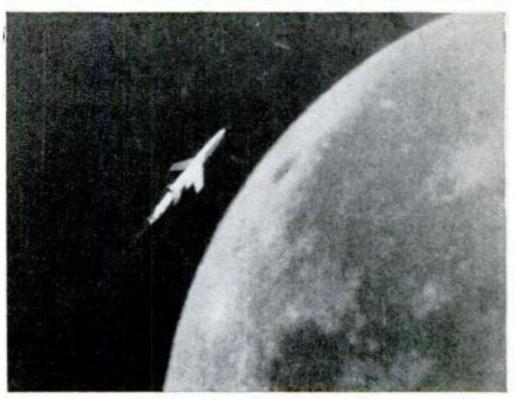
When G. Rivano couldn't find a lot in Genoa, Italy, on which to put a home, he built it on a barge in the harbor. He steadied the vessel first with concrete ballast. It still rolls a little with the tide, but Rivano is a retired sailor.

IIO POPULAR SCIENCE JULY 1959

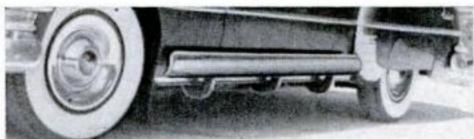
PS Picture News



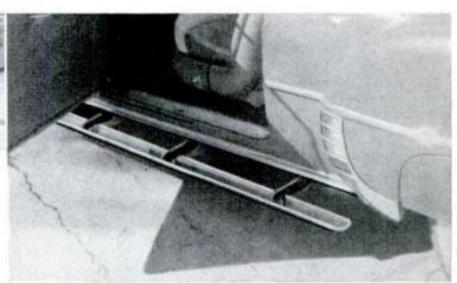
ROCKET WINGS. Aerojet-General's rocket pack is designed to let GI hover, fly vertically or horizontally. The left hand controls angle of thrust; the right, speed.



MOON ROCKET. This La Crosse surfaceto-surface missile appears to be passing the moon on a test firing in New Mexico. The illusion was caught in the 96-inch lens of a camera taking the moon some 239,000 miles away.

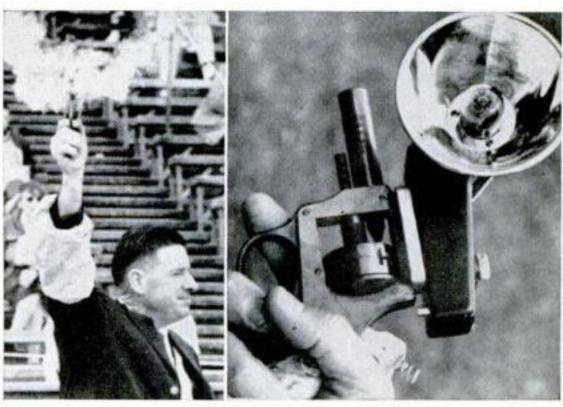


RUNNING BOARDS. Side bumpers (above) protect a car in sideswipes, keep doors closed. They swing down (right) as running boards when a door is opened. Inventor is Max Hoffman, Los Angeles.





BATTLE TV. The transistorized TV camera and back-pack battery transmitter above can be carried by GIs into action. The Tele-Tran units are connected by cable, operate on a single switch. The camera weighs four pounds.



VISUAL STARTING GUN. This radically different starting gun, used first at a Stanford track meet, enables timers at a distance to see as well as hear a signal. The close-up at right shows its simple mechanism: The battery circuit to a flash bulb is closed when the hammer strikes the cartridge.

How an

How light makes the meter's indicator needle move

BRIGHT LIGHT ENTERS METER (a reflectedlight Weston) through an auxiliary baffle on the back. In dim light, baffle is opened, fully exposing the lens. Moving the baffle changes light scales. Once through lens and inner baffle, light falls on a photocell. It penetrates a thin layer of gold on cadmium, striking a layer of selenium. Electrons here, stimulated in proportion to the light's intensity, cause 1/2 to 100 microamperes of current to flow to the gold coating. Wires LENS from the gold and the iron disk carry this INTERNAL current to the ammeter's moving coil, BAFFLE which deflects the indicator needle. METAL COLLECTING SURFACE SELENIUM BAFFLE ALLOY IRON DISK LIGHT SCALES MASK AND WINDOW SENSITIVE MICROAMMETER MOVEMENT

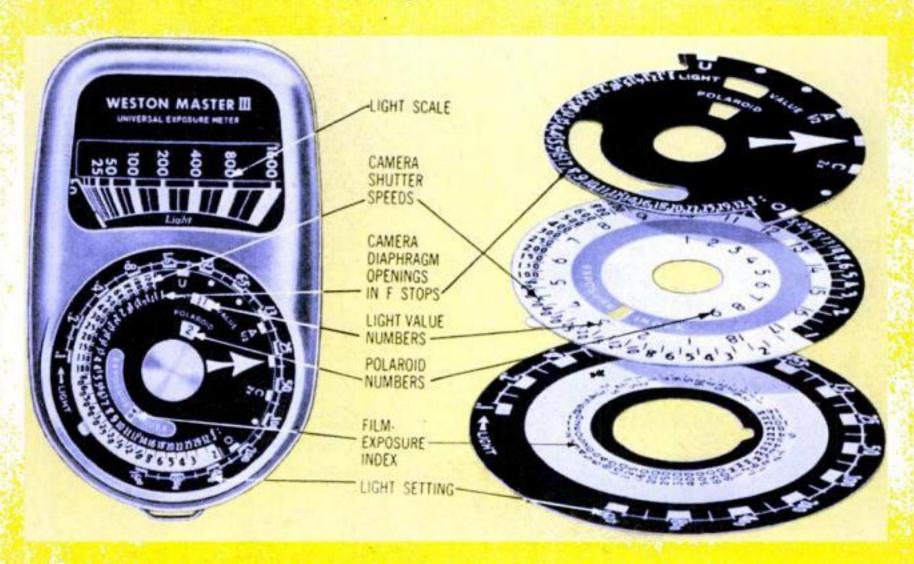
Exposure Meter Works



OST exposure meters are basically alike. A photovoltaic cell converts light to electricity, a microammeter measures the current, and dials calculate f stops and shutter speeds.

Meters are designed to measure either the light reflected from a subject or the light falling on one (incident light). The difference between these is in the lightgathering window and in the calibration.

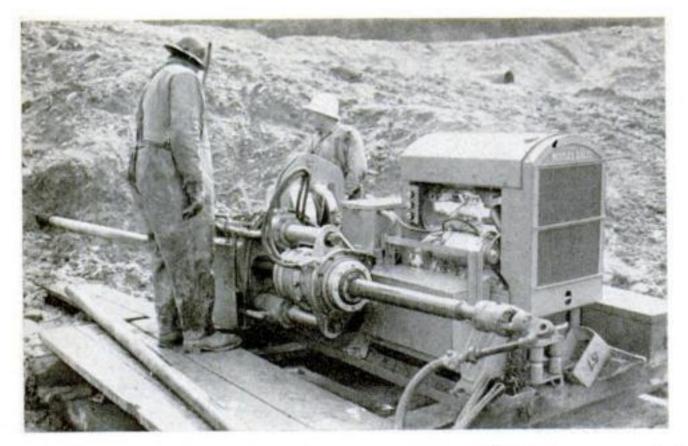
With the wide latitude of today's black-and-white films you can get by without an exposure meter for average picture taking. But for good b-&-w photos in dim light and for color shots, one is almost essential. If not dropped or left in sunlight or heat, a good meter lasts indefinitely—Erik H. Arctander.



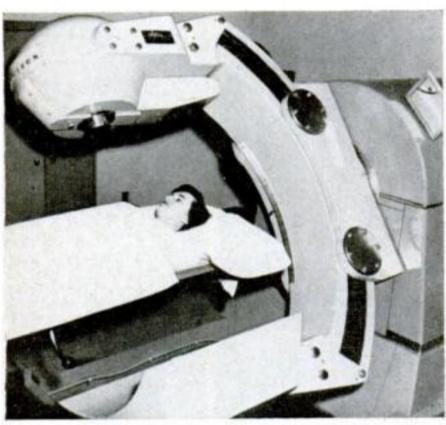
The calculator helps you select f stop and shutter speed

slide rule. You set the film's exposure index and the light reading on the dials. Then you select an appropriate combination of lens opening and shutter speed from the many that are indicated. The exposure indexes marked on this meter

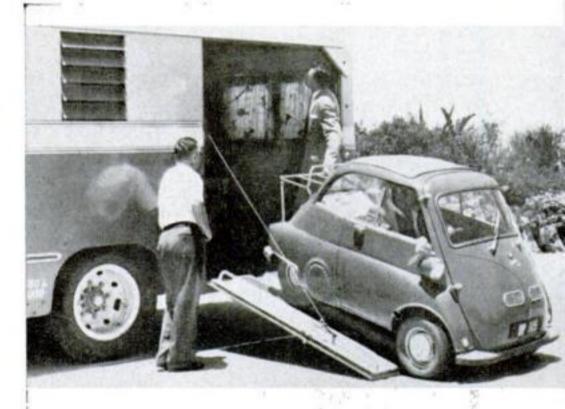
range from .1 to 16,000 ASA. Lens openings vary from f/1 to f/32 and shutter speeds from 1/1,200 second to 100 seconds. There are also two windows; one gives the proper light-value setting, the other indicates the correct exposure number for a Polaroid camera.



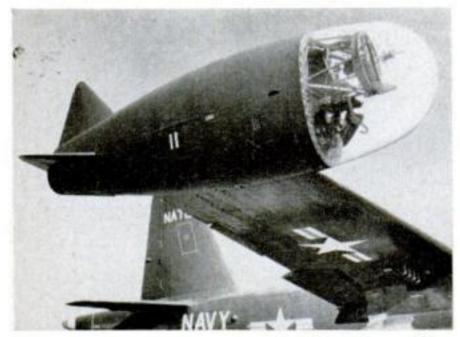
bores for drain pipes under highways and rail lines. The hydraulic head needs only 19 inches' ground clearance, swivels to any angle. It was adapted by Boyles Brothers, Vancouver, from a World War II drill that made anti-invasion demolition holes in airfields.



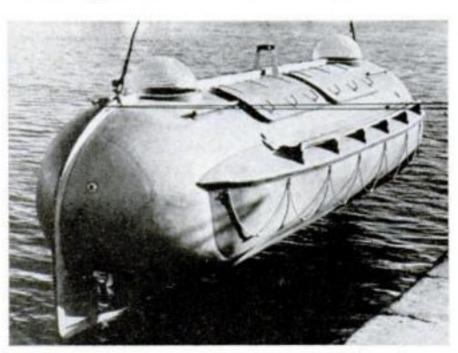
cobalt therapy. Radiation equal to 3,000,000-volt X rays comes from this unit at Allegheny General Hospital in Pittsburgh. The source rotates 360 degrees.



ATTACHED GARAGE. The family bubble car rides in the rear of this mobile home owned by a South African farmer. The hinged door acts as a ramp.



WING LIGHT. A 70,000,000-candlepower searchlight on the wing tip of the Navy plane above hunts enemy subs spotted by radar. Strong Electric makes it.

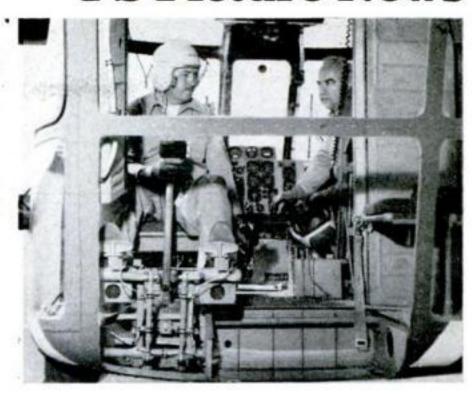


PLASTIC LIFEBOAT. Here's a self-righting craft that won't ship water in a storm. It's German made, seats 40, has sealed hatches, bubble lookout domes.

PS Picture News



S-60 has a swivel seat (right) in a lowhanging cockpit so the pilot can face his payload suspended from a hoist under the rotor. Flight controls are provided for both forward- and aft-facing positions.





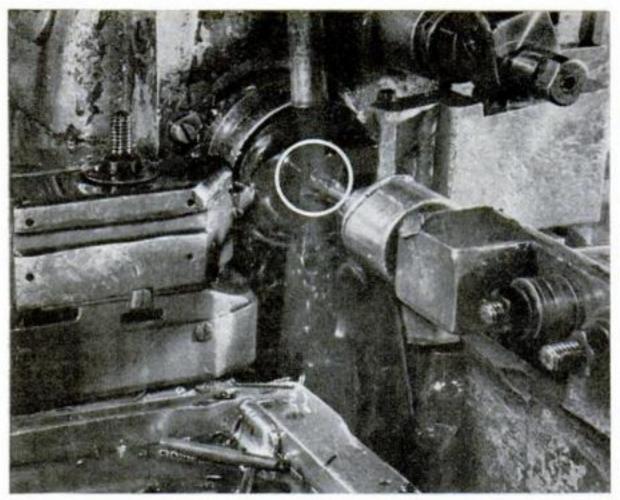
Metallic powder embedded in Koroseal makes the flexible permanent magnet shown here. B. F. Goodrich produces 10 miles of extruded shapes a week for refrigerator-door gaskets and other uses. It holds the door shut, replaces the latch.

tomers get belt service at the Federal Savings and Loan Assn. in Cicero, Ill., without leaving their cars. Deposits are placed on a tray in a "Snorkel" installed by Mosler Safe Co., carried to a teller in the window by under-pavement continuous belt. They talk by phone.

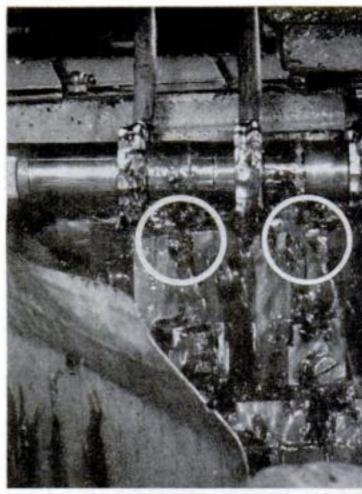


FOR A SQUARE MEAL. The round restaurant above is a recently remodeled famous German eating place, the Bastei, on the Rhine at Cologne. Patrons at window tables get a good view of boats on the river.





1 EACH TWIST DRILL STARTS AS A BLANK, cut from a 12-foot steel rod. Blanks for small-diameter drills (up to ¼ inch) are chopped off in a press. The automatic screw machine shown above is used to cut larger drills (see circle) and also starts the point.



2 FLUTES (CIRCLED) ARE MILLED on five large blanks at once in an automatic machine. As oil cascades over them, blanks slowly

Putting the Twist in Twist Drills



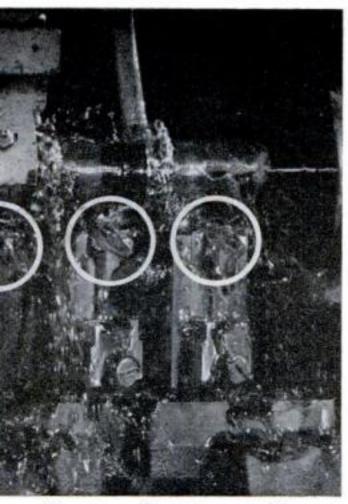
116 POPULAR SCIENCE JULY 1959

VER 150,000,000 drills of all sizes were shipped from U. S. factories last year—about 10 percent of them to retail stores for home use.

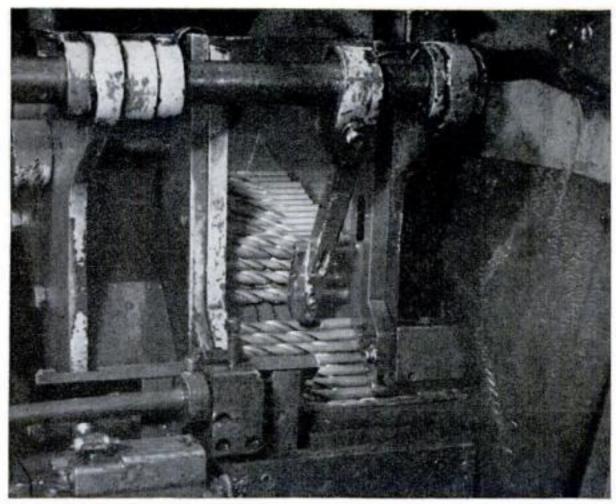
Drills are still made largely on handoperated machines, if only because there are 135 bit sizes up to a half inch. It would take at least that many separate production lines to turn out homeworkshop drills alone. Operations like cutting blanks and centerless grinding come closest to being automated.

Drill manufacturers like the Century Drill & Tool Co. of New York, where these photos were taken, constantly devise new machines to reduce hand labor. Many details are kept secret.

Home-user demand for various types and sizes of drills changes little from year to year. The quarter-inch size is consistently the largest seller. Longterm, there's a trend to high-speed (alloy) steel. Carbon-steel bits are less in demand.—Erik H. Arctander.

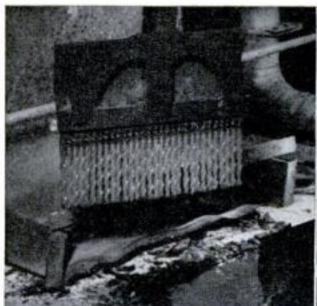


advance and rotate past the cutting heads. They do this twice, once for each flute. Small drills have their flutes ground.



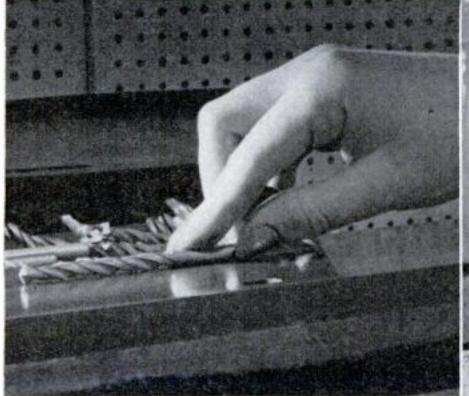
3 CENTERLESS GRINDING reduces a rough drill to exact size and smooths its surface within eight millionths of an inch. Pushed from a hopper (above) onto a blade, drills are then fed between a grinding wheel and a rubber speed-regulating wheel.

4 DIP IN FURNACE of molten anhydrous barium chloride, at 2,000 degrees, hardens the drills. Lifted out by tongs (near photo, right) after one to two minutes, they're dunked in quenching oil (far right) which catches fire. Later they are tempered for several hours by alternate heating and cooling.

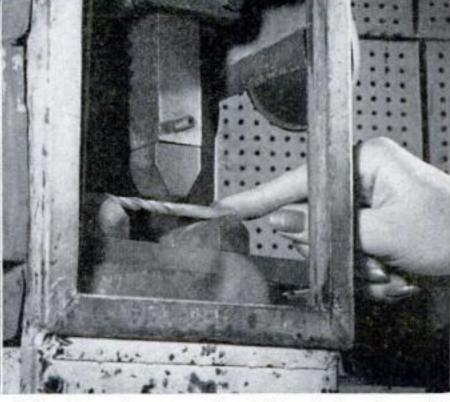


y as a set of the set of the set of the set

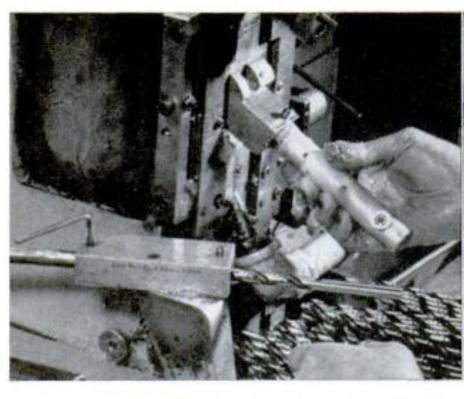


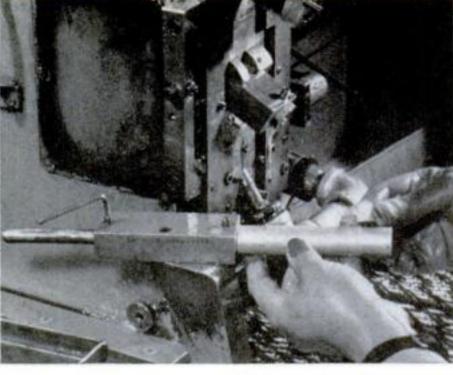


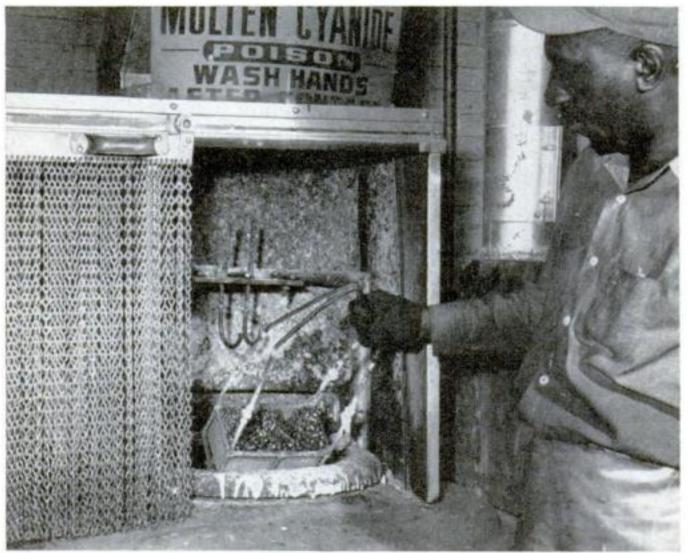
5 TO TEST FOR STRAIGHTNESS, drills are rolled across a steel plate that has been ground flat to within 5/10,000 inch (above, left). When



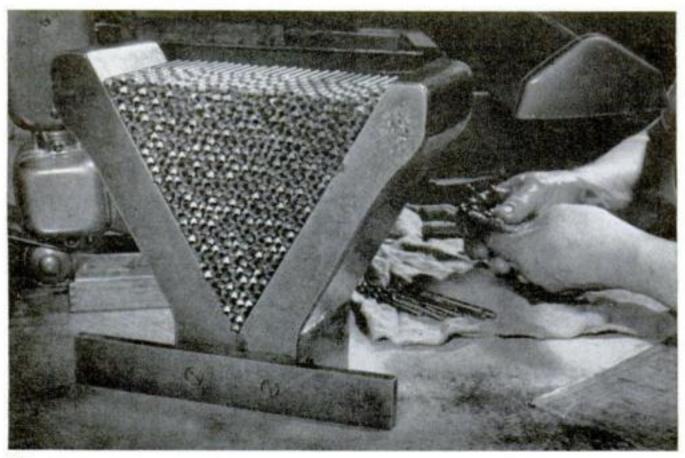
light shows between the drill and the plate, this indicates a bent drill that must be straightened in a hand press (photo above, right).







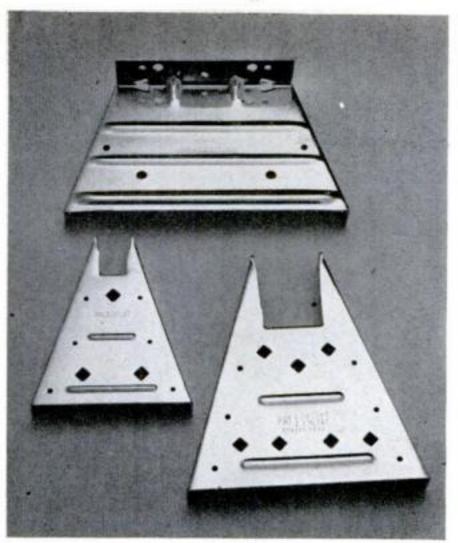
6 is done on a grinding wheel. Above, left, the drill is chucked in a tube, slipped through a bushing in the grinder enclosure and its cutting lips held against a wheel inside. Meanwhile, the next drill has been pushed into a stationary block (right) with an adjustable stop that sets depth of penetration. A setscrew holds the drill in the tube.



7 SURFACE HARDENING follows final grinding operations. Drills are loaded into a wiremesh basket and soaked in molten sodium cyanide. This "nitriding" process is done in furnace heated to over 1,000 degrees F.

8 takes place after washing and oiling. The main check is on drill points—the two cutting lips must meet exactly in the center. Drills are piled in a V-shaped holder for counting. A table tells how many there are from the number in the top layer.

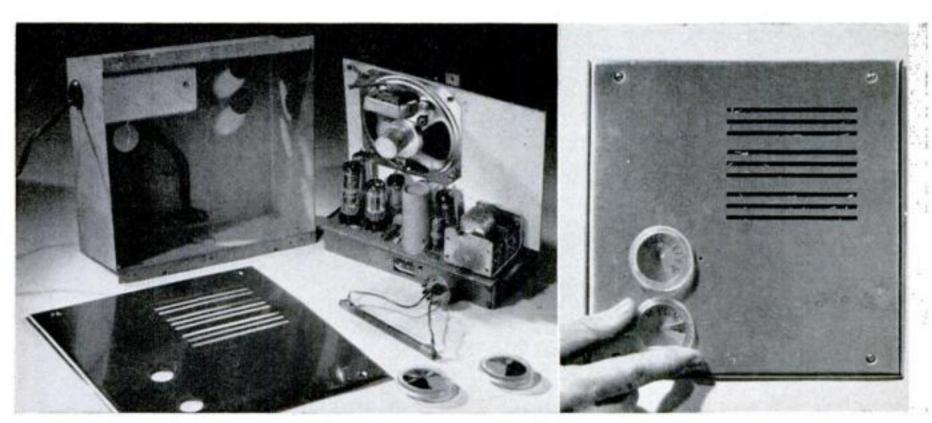
118 POPULAR SCIENCE JULY 1959





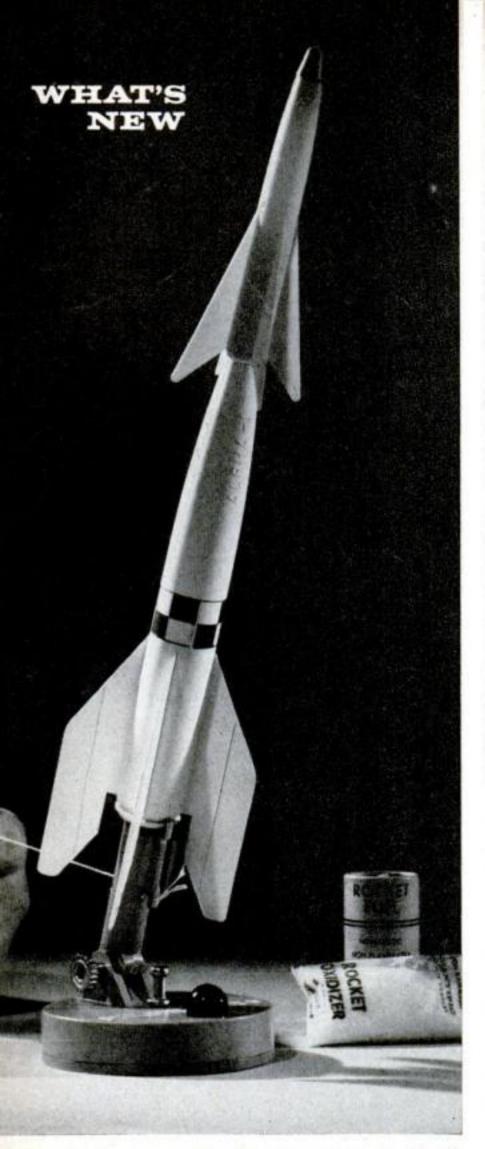
New Tricks for Old Horses

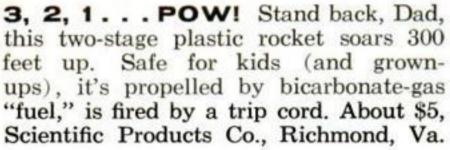
Proving that you can make more with sawhorse brackets than just sawhorses, the Larson company now supplies instructions for building many projects like these. The step stool and picnic table use the wide bracket designed for a flat cross rail. The seesaw uses slotted brackets for an edge-wise rail. You can buy the brackets separately for about \$2 to \$2.50 a set, or in kits that include all parts except lumber. Kits are available for the seesaw and step stool, also for swings and climbing gyms. Chas. O. Larson Co., P.O. Box 358, Sterling, Ill.



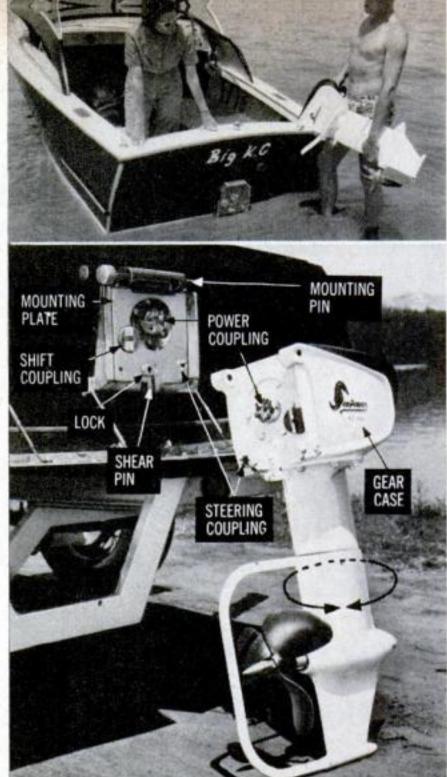
RADIO FITS IN WALL. Only 3" deep, this five-tube AM radio mounts flush between wall studs for a smart, modern look. A built-in junction box simplifies wiring to a nearby 115-volt outlet.

The 8½"-square faceplate comes in copper, stainless steel and colors, and can be changed inexpensively if you redecorate. About \$36, Acopian Technical Co., 1 Shimer Blvd., Phillipsburg, N. J.

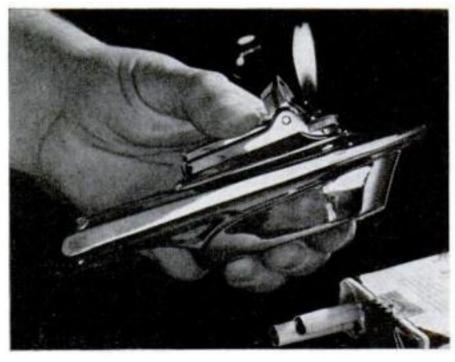




IT'S A BOAT, IT'S A . . . ? It's the latest table version of Ronson's butane-burning cigarette lighter. Priced at \$18.95, the new jumbo size uses no wick, lasts six to 12 months on a single filling. Ronson Corp., Woodbridge, N. J.



ers of inboard boats can add the convenience of this outboard-like drive. The propeller is hinged to the transom by a single pin that lets you tilt it up for beaching or remove it completely. The prop swivels for steering and shifts into forward, neutral or reverse. A shear pin lets it swing up if it snags. Made for engines up to 150 hp., "Outdrive" costs \$595. Sweinhart Electric Co., 2900 E. Olympic Blvd., Los Angeles.

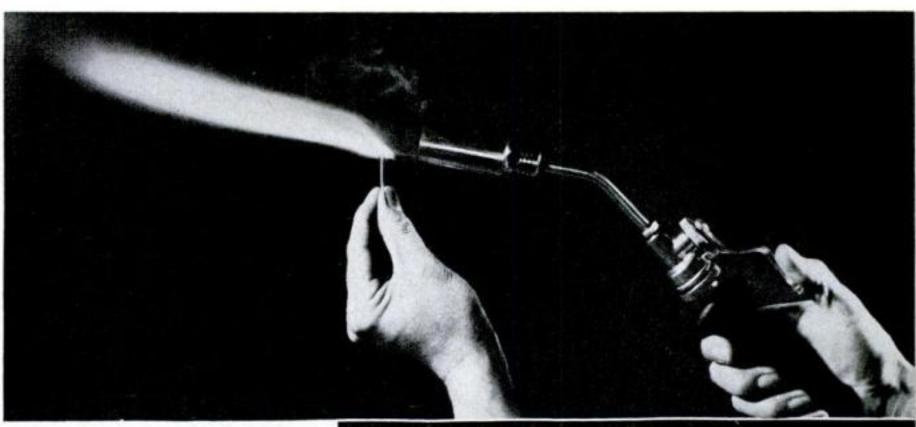




New Gun Has Super-Accurate Aim

Not a rocket pistol, this futuristic .22-cal. semi-automatic is the latest super-accurate target pistol used by U. S. teams in international meets. Weights slide in tracks below the barrel to adjust balance. A muzzle stabilizer uses

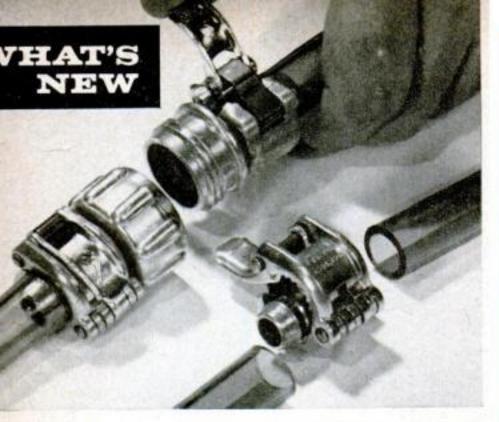
the downward force of vented gas to prevent jump. Quick-change barrels 6\(^3\)/4", 8" and 10" long snap on by a single pin. You can set trigger motion as fine as .006". Models from \$85 to \$110. High Standard, 1817 Dixwell, Hamden, Conn.



GUN-GRIP TORCH.

This hose-fed propane torch lets you work on ladders or in tight spots without carrying a gas tank with you. It hooks to any five-, 10-or 20-lb. tank up to 24 feet away. It's about \$25. New camp lantern and cook stove at right, \$39.95 a set, can be run from the same remote tanks. Turner Brass Works, Sycamore, Ill.





QUICK FIX. A flip of a lever locks these hose couplings and menders. Franklin Metal, Hatboro, Pa.

'HUSH' PAINT. Cork particles in this new paint are said to cut room noise 35 percent. Acoustex Corp., 51 E. 42nd St., NYC.



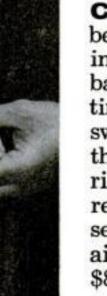


Yellow bug-repellent bulbs now come in projector types for yard lighting. Penetray, 615 Front St., Toledo.

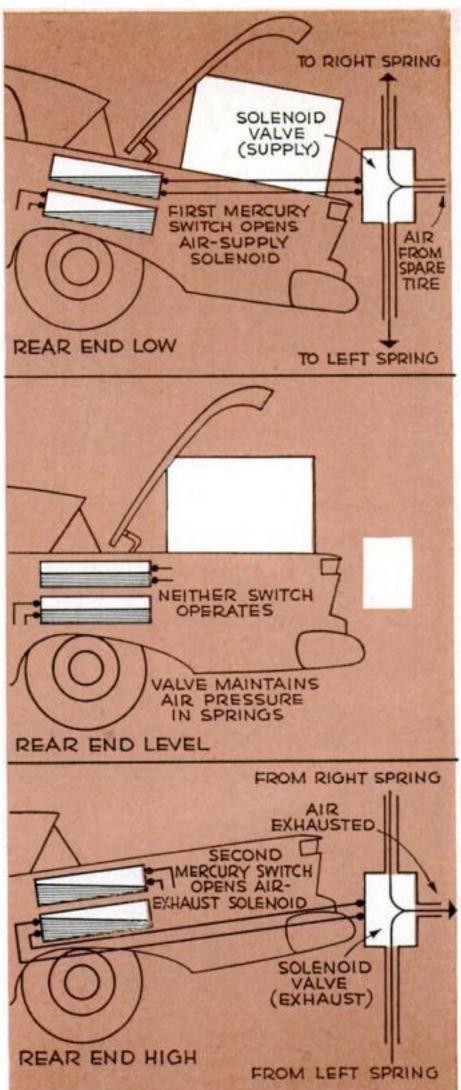


Magnetic pad grips car to speed polishing. Magnovia Co., Box 212, Murray Hill, N. J.





122 POPULAR SCIENCE JULY 1959



CAR LEVELS ITSELF. You can beef up your rear springs for carrying extra-heavy loads with accessory air bags that use air from just your spare tire. As the rear sags, it tilts a mercury switch (top sketch) that feeds air from the spare to the springs until the car rides level (center). When the load is removed and the rear rides high, a second mercury switch (bottom) exhausts air until the car levels out again. About \$80 to \$90, Powairide Products, 112 Hillcrest Ave., New Castle, Pa.

If Disaster Struck...

How well would you react?

By Lawrence Galton

DISASTER strikes a community. What do people do? Panic? Trample each other? Forget all but themselves and their property? Does looting become rampant? Are large numbers left permanently sick mentally? So novels plays, movies, radio and TV dramas often indicate.

Is this how people really behave? Is it how we'd behave if the Russians struck suddenly?

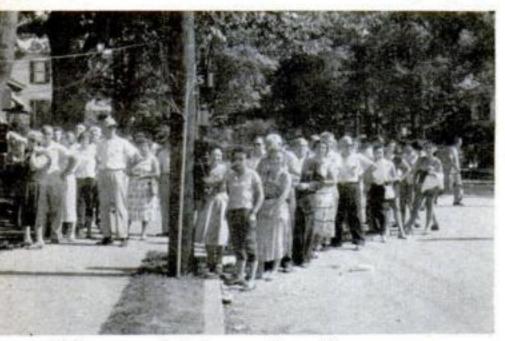
There has never been a shortage of disasters—floods, tornadoes, fires, explosions, earthquakes. But now, in what has been called an "age of megadeaths," with American cities open to assault with weapons that could cause staggering destruction, it has become more essential than ever to know how people react to, and deal with, extreme situations.

Now, for the first time, science is trying systematically to find out. Disaster-research programs have been undertaken at a number of universities—Chicago, Maryland, Oklahoma, Johns Hopkins, Columbia, Michigan—and abroad. In 1951, at the request of the Surgeon General's Office in the Defense Department, a Committee on Disaster Studies was set up to act as a clear-





Few panic. These flood victims salvage supplies, set out to make a new home elsewhere—and smile.



Many seek information. Emergency phones helped handle a deluge of inquiries following a flood in '55.



The public gives freely, sometimes oddly. Once a carton of falsies turned up among clothing donations.

Superhuman endurance shows up. After eight trapped days, a Springhill coal miner waves cheerfully.



Struck by wind, wave or war,

ing house for the research. About 40 studies have already been made.

Along with facts you might expect, the studies have been turning up many surprising ones. Here are some:

A few people may act foolishly and unheroically, but panic is rare

On August 19, 1955, after much of Port Jervis, N. Y. had been flooded, a rumor spread that a big dam above the city had broken. A bartender, hearing it by phone from his wife, silently turned over his work to an assistant, and fled. A city councilman packed himself off with his wife and left an elderly couple, roomers in his house, to manage for themselves. One woman had feuded with a neighbor for years. Unaccountably, on hearing the rumor, she rushed to help the neighbor, then fled with her—and forgot completely about picking up her mother who lived on the same street.

These were three of the 25 percent of the population who left town. The rest waited until the rumor was proved wrong. Many checked for themselves. And among those who did leave town, with a few exceptions, flight was not panicky.

Even stunned victims recover quickly-and pitch in to help

During the full impact of a disaster—when objects are flying, walls collapsing, or floodwaters rising—people try to keep themselves alive and protect those around them. Within the first 30 minutes after a tornado hit White County, Ark., for example, 32 percent of all people in the immediate area were searching for the missing, 11 percent were engaged in rescue work, 35 percent were doing emergency-relief jobs. Within two hours after a tornado had struck Flint and Beecher, Mich., in 1953, three-fourths of the casualties had been evacuated to hospitals.

Some behavior looks like panic—but isn't

An outsider coming into a disaster area sees people running or driving in opposite directions, seemingly unaware of

124 POPULAR SCIENCE JULY 1959

man is stunned, rallies, and often rises to heroic heights

each other. Some apparently just look at or talk to each other; a number dig in debris; others try to retrieve belongings; still others comfort the injured. Much activity seems aimless. This is why disaster populations often are mistakenly said to have "panicked." There is disorganization—but not necessarily panic. And many people are working with a sense of organization and clear purpose.

Unusual leaders often emerge

Generally those who take leadership roles in a disaster are officials with well-defined responsibilities. But leadership often comes from unexpected sources. A prime example: In Waco, Tex., during the first day after a tornado struck in 1953, a young woman took charge of a first-aid station in the downtown area. She requisitioned supplies from a drug store, distributed sedatives, ministered to the injured. Later, it was found that the girl had no medical training of any kind; she was a restaurant car-hop and part-time prostitute.

More people rush to, rather than flee, a disaster

Contrary to the popular idea that there is a great deal of flight from disaster areas, there is a much greater movement toward them. Convergence is a universal phenomenon—and a problem since it oftens slows organized relief efforts.

In the summer of 1951, a chemicalplant explosion and fire occurred in Kanasha Valley, Charleston, W. Va. Within 10 minutes, despite a drenching downpour of rain, every road leading to the plant was congested. Firemen coming to help had to walk as much as three miles, unable to drive any closer.

Why do people converge? Many do so because of personal concern for family or friends. Many come to help. Still others gather out of curiosity. But the evidence suggests that the curiosity isn't neurotic, or "ghoulish glee" in seeing suffering or destruction. Instead, it's based on the need to see and understand events that lie outside the individual's ordinary experience. Thus, in



A sense of humor survives. This was one man's reaction to a tornado that destroyed his home.

London during World War II, after bombing became almost routine, little curiosity convergence occurred.

There is also an "informational convergence" after a disaster

An amazing number of inquiries are received—some very strange. Queries from outsiders about relatives and friends who might have been hurt are expected. But in disasters where only a few hundred people are affected, inquiries may run to hundreds of thousands.

After a disaster, the surrounding community quickly lends a hand

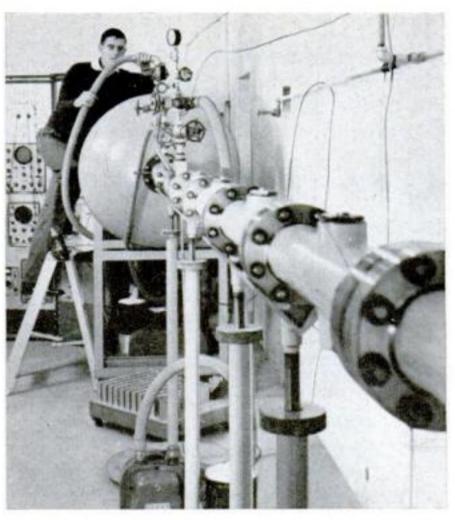
At least 50 percent or more of the primary work in sudden disaster in American communities usually is done by volunteers. When word of disaster gets out, not only police, fire department, civil defense and other regular emergency agencies, but the lay public and agencies

[Continued on page 208]

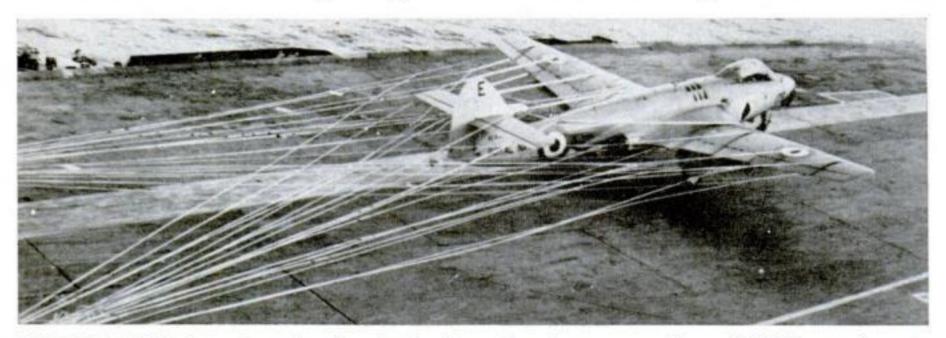
PS Picture News



SHELF PHONE. This boothless pay phone is under test in Milwaukee in public places where booths would take too much room. Vertical slots lead to a coin box behind a soundproof panel.



HOT SHOCK. The 18-foot shock tube above lets Shell Oil study chemical reactions at extreme temperature and pressure. The steel ball at the end holds a vacuum for cooling after the "shot."



SPIDER WEB. A network of elastic nylon is now used on British carriers to snare aircraft unable to lower an arrester hook to catch the barrier for a normal landing. The webbing can be set in place in two minutes.

DOUBLE PIGGYBACK.

New Chevrolets already twodecked on a truck transporter get a lift at right on a railroad flatcar. The triple-deck innovation is being tried out by GM and the Southern Pacific for deliveries from the Oakland, Cal., plant to dealers in Oregon and Washington. One tractor puts the trailers on; another takes them off.



126 POPULAR SCIENCE JULY 1959



There's Money in Marinas

Want to be your own boss?

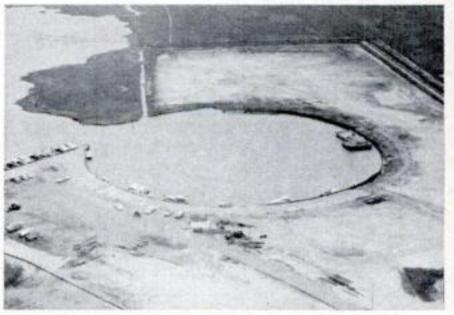
Marina owners say, "Come on in

—the boat business is fine!"

By Max Gunther

NCE Frank Voight was a quality-control inspector for Republic Aviation on Long Island. But he loves boats and the relaxed outdoor life that goes with them. So one day four years ago he quit his job and bought a boat-renting business with 12 rowboats on a canal in nearby Freeport.

Doing most of the work himself and investing \$40,000 (part saved, part borrowed) he transformed the Hudson Point



THE SEAFORD-MAR MARINA started in 1955 as a piece of Long Island marshland. Two years ago (above) dredging was largely completed. Today (top) there are docks for 240 boats, with an apron and service buildings. Operator Vincent Bravo sold \$250,000 worth of stock to build it.

127

Money, know-how and planning are needed for a



1 Have money to get started. Savings are seldom enough; you will probably have to borrow, too. Or raise capital by forming a partnership or corporation.



2 Ask an expert. It pays to get advice before buying a site—developing the wrong one could break you. An expert will suggest the best layout for it, too.

Fishing Station into a 90-boat marina, a waterfront facility for storing and servicing customers' boats. His gross income this year will be about \$75,000, he guesses, and there's a long waiting list of prospective customers.

Martin Lunsford, fed up with a desk job in Washington, D. C., 12 years ago bought a surplus government boat and began looking for a marina site. While living aboard his boat with his wife and small daughter, he found and leased an abandoned oyster house on Monroe Bay just off the Potomac River. There was then little boating interest in that area, 60 miles below Washington.

Today the Lunsfords' Colonial Yacht Club is a model installation with dozens of covered boat stalls and other facilities, including a good restaurant. There are plenty of customers to keep them busy.

The Kiskiewicz family started Maryland Marine outside of Baltimore about 10 years ago. Now a combination marina, marine retail store and boatbuilding yard, it grew from an old chicken house and a \$100 investment.

Vincent Bravo was a New York outdoor-advertising specialist when he decided that a small, marshy bay on Long Island's south shore would be a fine spot for a marina. Figuring that dredging alone would cost about \$100,000, he set up a corporation and got hold of \$250,000 by selling stock.

Dredging and building started in 1955. Now the Seaford-Mar Marina has all 240 dock spaces rented. Bravo plans to issue more stock, hopes to end up with a marina five times as big.

According to the National Association of Engine & Boat Manufacturers (NAEBM), more than half of the 7,330,000 recreational boats in the U. S. are stored on trailers or pulled up on shore. And, the NAEBM estimates, some 2½ million more boats could be sold if more moorings and slips were available.

There just aren't enough boat-parking places to meet the demand. The shortage promises to get worse, too. Last year Americans spent \$2 billion on boating—three times the 1950 outlay. As one marina veteran explains it: "Boating used to be strictly a man's sport. A guy would hold off buying a boat because of what his wife might say. But today it's a family sport. The wife is as anxious to buy a boat as her husband."

If you decide to start a marina, you'll be stepping into a lively market. But don't imagine yourself loafing in the sun while money rolls in. Like any other business, a marina needs careful advance planning, efficient management, hard work and a touch of luck. Most of all, it takes enthusiasm for boats and the water—marina operators usually have prior boating experience.

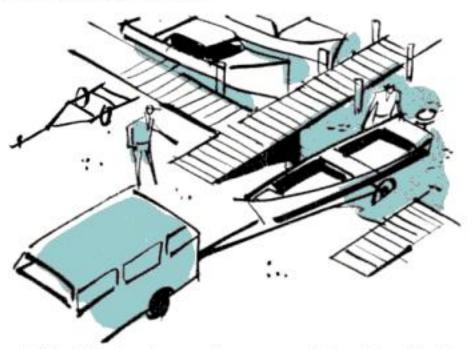
Once you decide to go into the marina business, try to learn all you can about it. One way is to drive around and visit as many small-boat installations as pos-

128 POPULAR SCIENCE JULY 1959

successful marina. Here are six steps to make it go



3 Dredge to a navigable depth. There should be at least five or six feet of water at low tide next to docks and launching ramps. Dredging is expensive.



4 Build docks and ramps. Renting dock space is a marina's main business. But remember that transients with trailered boats that need ramps also buy things.



5 Provide adequate parking. Most of your site's land area will be taken up by parking space. Note: Cars with trailers take some extra room to maneuver.



6 Offer food and service. They add valuable income and increase overall business. Marinas with these extra facilities can charge more for dockage.

sible. Take pictures, make notes, question the operator if possible.

Get other expert advice, too. The Outboard Boating Club (307 N. Michigan Ave., Chicago 1) and the NAEBM (420 Lexington Ave., NYC 17) are good places to start. The American Wood Preservers Institute (111 W. Washington St., Chicago 2) also offers planning and construction information. Major oil companies selling to the small-boat trade are another source of help. "In some cases we'll even draw up plans for a marina," says George Maxwell, manager of Socony Mobil's small-craft division. You'll have to show you're seriously interested, of course, and will use that company's fuel.

Picking the site is important. Most marinas are started in the operator's general neighborhood. But this may not make sense for you. In and near large cities, waterfront land is often unobtainable, prohibitive in cost or surrounded by unattractive industrial property. Competition, too, may rule out your own area. It need not rule you out of the marina business, however.

"Don't overlook the possibilities of pioneering in this field," advises J. A. Emmett, boating editor of *Outdoor Life*. "Remote sites are often preferable to those near big cities." His suggestions:

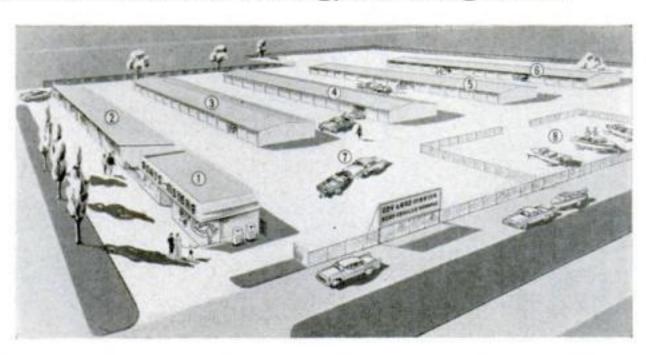
 Study those areas where there promises to be a new or growing interest in boating. A federal or state flood-control, power-generation or navigation-improvement project usually creates a worthwhile body of water. (There are already

"Dry-Land Marina" Is Newest Idea in Storing, Servicing Boats

WHERE sites on the water are scarce or too expensive, the dryland marina can put you in the boat business anyway. Conceived a year ago by Robert H. Scott of Evinrude Motors, the idea has been tried out successfully in Houston and Corpus Christi, Texas.

An operator might own his own launching ramp

nearby, rent one or locate close to a municipal facility. To make out, says Scott, he would need at least 40 boat-storage stalls to start with, each renting for about \$10 a month. He would also have to sell boats, motors, trailers and accessories.



A typical dry-land marina would include: (1) main office and accessories showroom, (2) showroom for boats and motors, (3-6) storage sheds for customers' boats and trailers, (7) parking and (8) self-service maintenance area.

83,000 recreational boats on 126 federal reservoirs in 36 states. Often, exclusive marina rights on these artificial lakes are leased to individuals.)

• Investigate possibilities along our main waterways, with an eye on business from cruising boats. There is the Intracoastal Waterway on the Atlantic Coast —from Norfolk, Va., south to the Florida Keys. An expansion of this sheltered route up Florida's west coast is a possibility soon; this would open up a new

obility and the second second

A MARINA OPERATOR can expect hard work and long hours until he's able to hire enough help. But the work is outdoors, usually in fair weather, and it can bring rich financial rewards.

area and link the Atlantic and Gulf coasts for small boats.

• Check along the Mississippi and its main tributaries, like the 600-mile-long Tennessee River, where there are still opportunities. Add to these the Great Lakes, Puget Sound in Washington, the delta country back of San Francisco, and the Gulf of California.

Emmett favors southern areas because of the longer boating season there. As for out-in-the-country sites, they offer cheaper land in more attractive surroundings. And being isolated they must be largely self-sufficient—which means you can supply a wider range of services to boost total income.

Once you settle on a general area, it's time to look for a site. "This is one of the most important decisions to be made," says NAEBM's booklet, *The Modern Marina*. "The planner cannot afford to be influenced by sentiment or appearances."

Study a promising site from the viewpoint of how much improving you will have to do. Unless it has a firm beach with a fairly steep slope into deep water, you will have to build a launching ramp for trailered boats. Non-trailered ones will need to be hoisted in and out—probably by derrick or crane directly from deep

[Continued on page 212]

PS Picture News

ROAD HOG. This huge truck is 16 feet wide, rides on eight-foot tires, carries a load of 100 tons on or off the highway. It was built by Berliet in France, shipped to the U. S. for display, after which it will be used for transporting heavy rigging in oil fields inaccessible to conventional trucks.





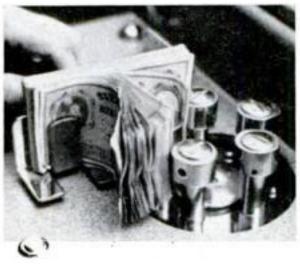
HIGH FLYER. Long, narrow wings keep the top-secret Lockheed U-2 aloft at 55,000 feet or more for long periods. The strictly hush-hush craft has just been put into weather and upper-atmosphere research service by the Strategic Air Command after intensive testing by the National Aeronautics and Space Administration. Units are based in the U. S. and Puerto Rico, have been seen over England, Tokyo and Turkey.

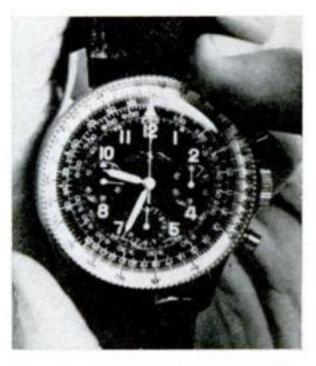
JERKOMETER. A truck driver is wired for jolts at right in a test by Chevrolet engineers to record riding reactions. Each motion of his head—up, down, forward, back or to the side—is registered on sensitized tape. Cargo is tested the same way.

BILL COUNTER.

To spare clerks a boring job, a Swedish bank uses this automatic computer. Stacks of kroner notes of the same denomination are leafed through by the rotating counting heads at right. The tireless machine handles 800 bills a minute.





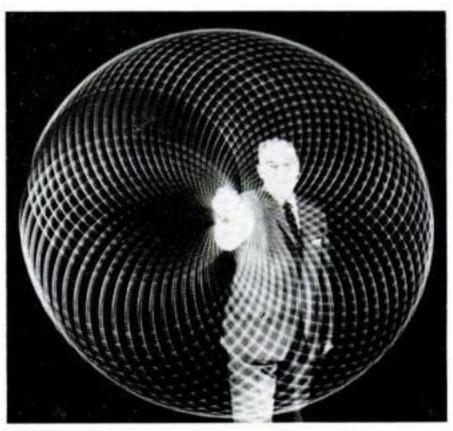


SLIDE RULE. The Swiss wrist watch above has a rim that revolves to make mathematical calculations. Graduations are marked to solve such problems as multiplication, division, cube roots and squares.

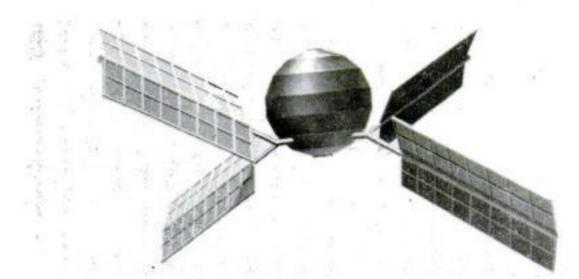
PS Picture News



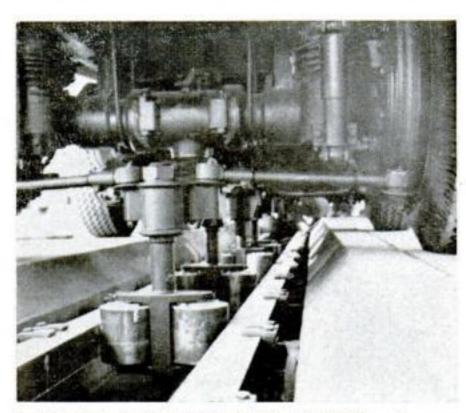
POROUS METAL. Water pours through this plate made at the Illinois Institute of Technology. The process binds metal fibers into strong, light products suitable for rockets and filters.



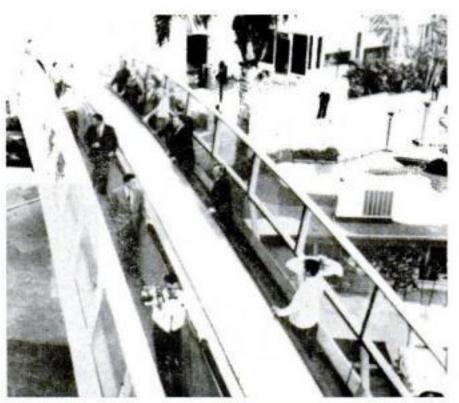
WHIRLIGIG. The pattern above was made by a hula hoop whirling in the light of two pulsed xenon-arc lamps. The new GE photo lamps appear to burn continuously—actually flash 120 times a second.



sun paddles. At least one fin on the odd satellite at left always faces the sun. The paddle wheel is lined with solar cells to provide continuous power for a battery and instruments in the sphere. NASA plans an orbit for it of up to 30,000 miles.



RUBBER-TIRED TRAINS. A new subway being built in Milan, Italy, will run on automobile-type tires. Vertically mounted hard-rubber rollers between center rails will keep the cars on the track.



ESCALATOR CROSSING. Room service is provided by bridge for guests in a motel annex across the highway from the El Cortez Hotel in San Diego, Cal. The waiters travel on a continuous belt.

132 POPULAR SCIENCE JULY 1959



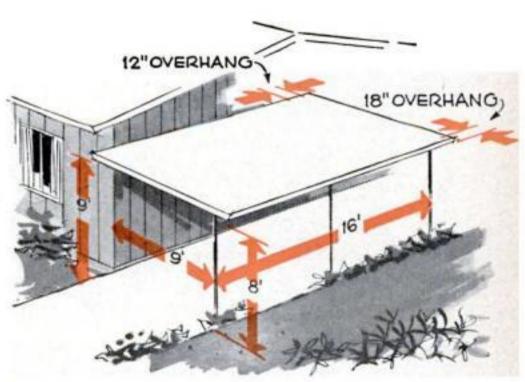
Find the carport that suits you, then see how it's built in this—

Roundup of Carport Ideas

By Hi Sibley

ANY people overlook one fact when they think about a carport: A well-planned carport eventually can be enclosed and fitted with a door to become a garage if the open shelter proves unsatisfactory.

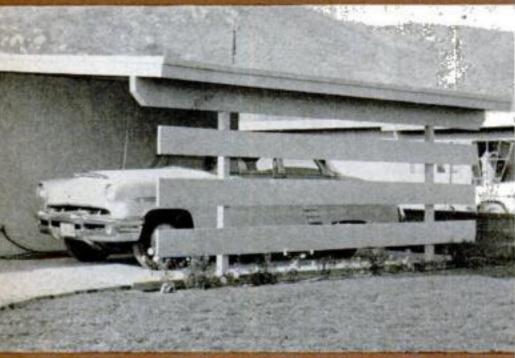
Carports first became popular in California, where the greatest need is to get the car out of the hot sun. With no snow load to worry about, a lightly constructed flat roof is typical. In other parts of the country, where flat-roofed homes are less common, a gabled carport similar to the one shown above may be more suitable, and it will carry out the lines of the house. A flat roof in snow country must



HOW BIG SHOULD IT BE? Minimum dimensions for carport are shown above. At least 9' of width is needed for easy opening of doors; 12' is better. Pitched roof is necessary for drainage.



SIMPLEST CARPORT is a roof like this one supported by two posts. Concrete footings, set just below the frost line for the locality. provide a firm base for the posts.



TO ADD PRIVACY, nail a few one-by-eight rails to the posts. These also keep out drifting snow. Rails can be spaced as shown, or butted to form a waist-high shield.

be built to support a heavy pile-up of snow or it might sag in the middle.

Structurally, the three most important elements of a carport are: 1) secure anchorage to the wall of the house; 2) a rigid roof securely anchored, and 3) a foundation for the outboard supporting posts, firm enough not to settle in soft soil or heave from winter's frost. Any carport design should incorporate these structural points.

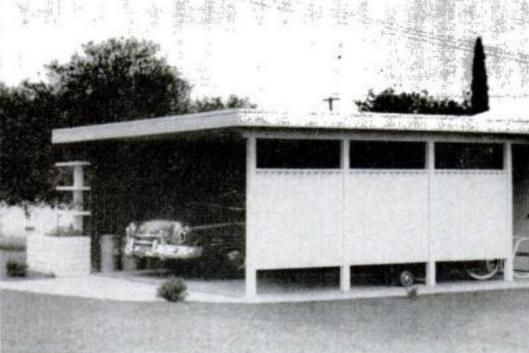
To anchor a carport roof. One popular method is to fasten a four-by-four or two-by-six to the wall with lag bolts driven into the studs of the house, or with masonry anchors if the house is brick or concrete. The roof is then built out from this beam.

Where the house roof overhangs and is the right height, the carport roof rafters can be nailed to the house rafters, and the roofing material of the house continued out over the carport. If the house roof is steeply pitched, an anchor strip can be fastened to the wall beneath the house rafters and the carport rafters nailed to both. The result will be a continuation of the house roof, but at a shallower pitch, usually a 1" rise in 12".

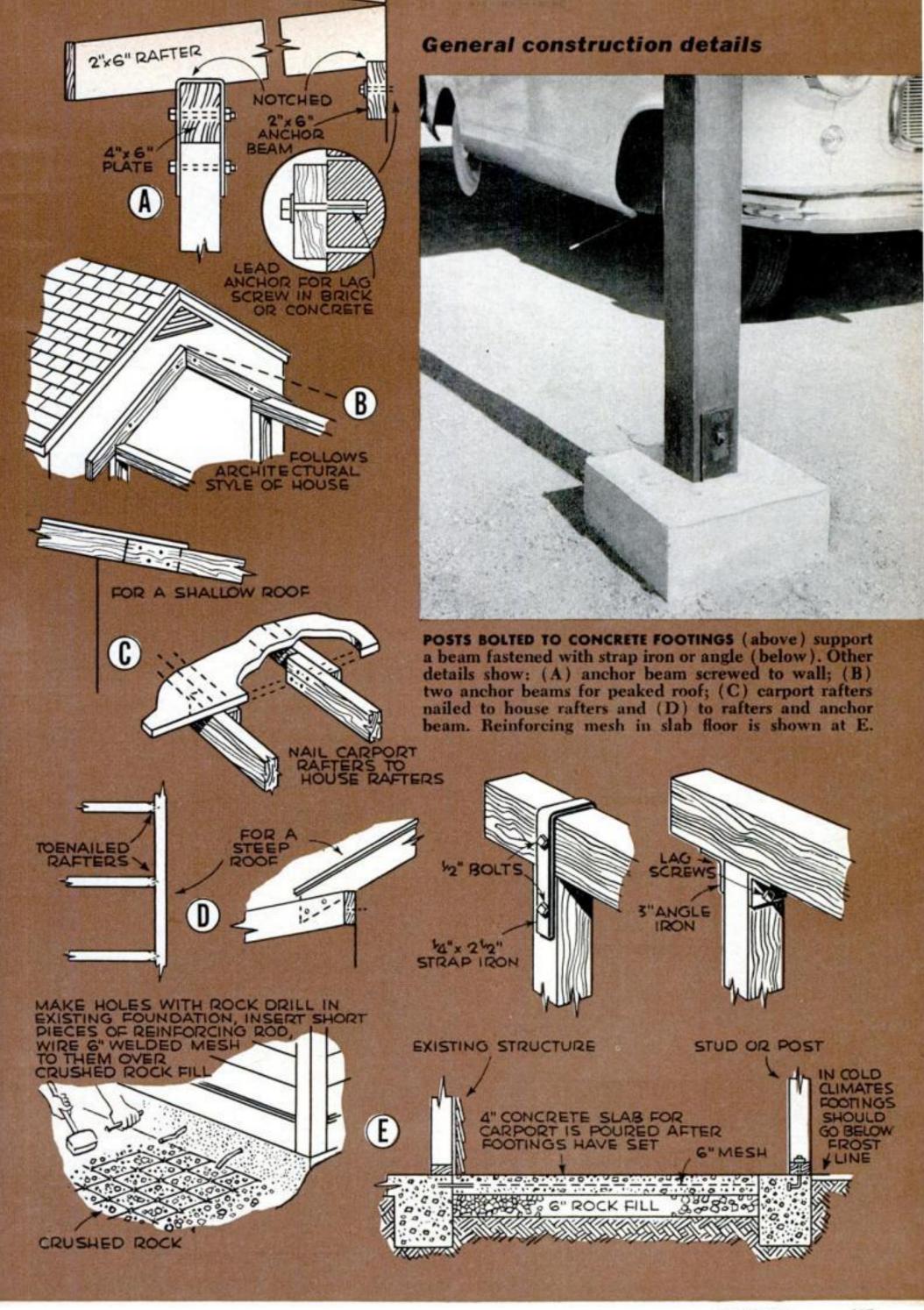
The outboard edge of the roof is sup-



TRELLISES with climbing plants add interest to basic structure. Only difference between this carport and simplest one is roof, which extends beyond house roof at front as well as side.



VERTICAL LOUVERS provide complete privacy, vet admit air. Louvers are made by nailing oneby-five strips vertically between pairs of twoby-four rails set between posts.



The type of roof you choose makes a big difference . . .

ported by posts bolted to firm footings of concrete set in the ground below the frost line. Footings can be poured into forms built of plywood. Suspend a 12" length of strap iron in each form so that 4" of it protrudes above the concrete after it is poured and the surface has been troweled flat. Posts can be bolted to these anchor straps when the concrete sets.

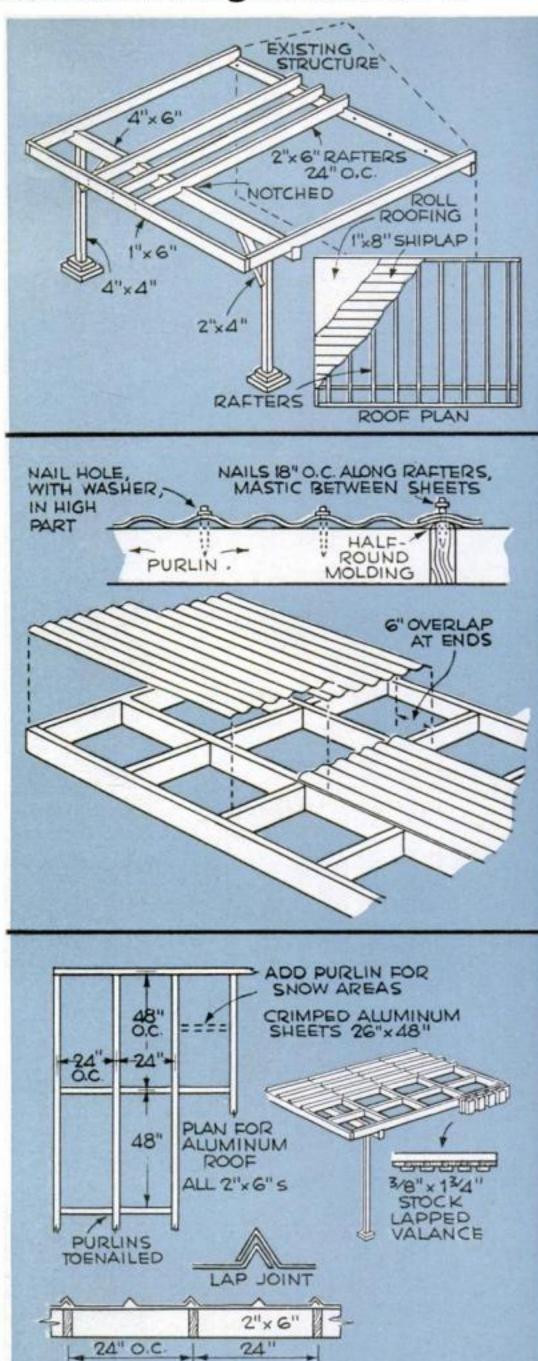
A slab floor can be poured after the carport is built, but it will be easier if you put in the rock fill and pour the slab after the footings have set. Place 6" wire mesh over the rock to reinforce the concrete and prevent cracks. The slab should pitch \(^{1}/_{4}\)" per foot for easy drainage.

After erecting the posts (four-by-fours are generally used), straddle them with a four-by-six plate, allowing the desired overhang at each end. The plate can be fastened atop the posts with strap iron and bolts, or with angle iron and lag screws.

The rafters are cut and toenailed to the plate and to the anchor beam or house rafters. The roof will be more secure if the rafters are notched to fit the plate and anchor beam. Several rows of purlins or lateral stringers should be toenailed between the rafters to support the roofing material, whether it be aluminum, corrugated fiberglass, or shiplap covered with roll roofing or shingles.

Decorative additions such as a trellis, louvers or rails along the side can be added without affecting the structure. A good way to plan your carport is to take a photo of your house, then sketch in several of the designs shown, or a combination of several, to get a preview of how the carport will look when it is completed.

A detached carport may be preferred to one built against the house; except for the posts, there is little difference in construction. To stand alone, posts must be set in concrete and braced diagonally, at least on one side. The braces can be made decorative by covering them with a trellis. Iron posts set deep in concrete will stand alone without bracing, and roof members can be bolted to square steel plates welded to the tops of the posts.



Match it to the house roof or make it distinctive

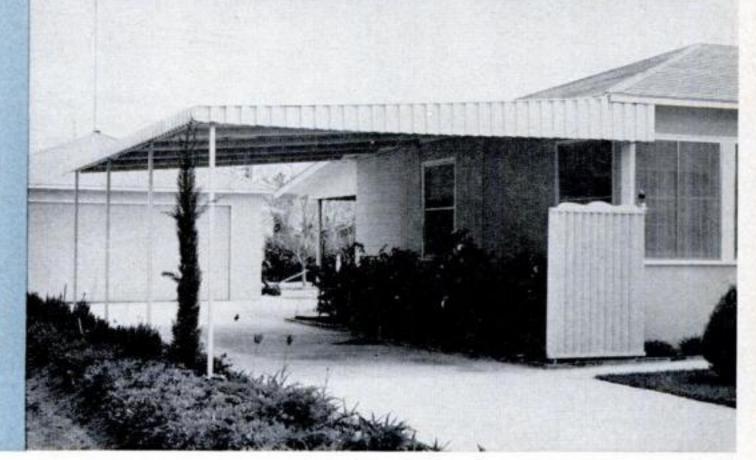
shingles can be laid on a base of shiplap or plywood nailed across the rafters. Purlins are seldom necessary, as the wood covering ties the rafters rigidly together. This type roof is probably the least expensive to build and requires little maintenance.



TRANSLUCENT fiberglass roof sheds a
soft glow, yet keeps
direct rays of sun
from heating car.
Panels are nailed
over a sturdy grid
structure, and corrugations run from
house to edge of carport for drainage.
Where panels overlap, clear mastic is
used to seal joints
against leakage.



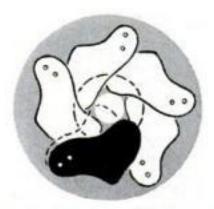
sheets can be nailed over rafters, but purlins must be toenailed between them for additional support. Crimped joints run away from house. Valance is made by spacing and overlapping wood strips vertically to create the effect of a commercial aluminum awning.







AT 1/500 SEC. or slower, shutter blades travel the full distance. Opening: f/2.



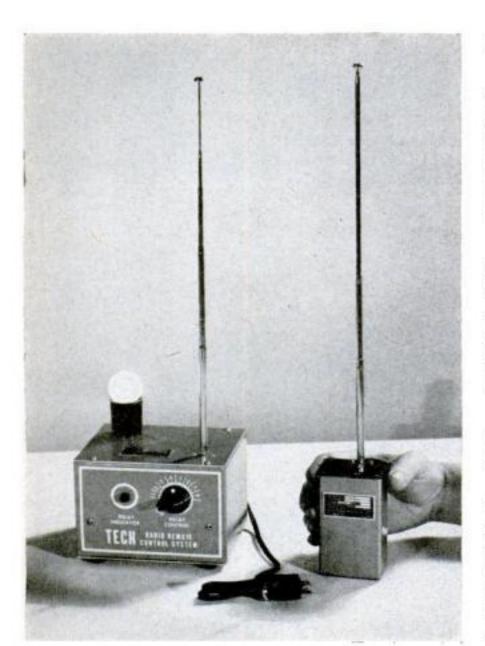
AT 1/2,000 SEC., blades start closer together and travel much less. Opening: f/8.

Fastest Camera Clicks at 1/2,000 Second

A NEW 35-mm. Japanese camera boasts the fastest between-the-lens shutter of any popular make. Top speed for this kind of shutter is usually 1/500 sec., but the Minolta V-2 can make a 1/2,000 shot.

The shutter has cam-operated stops

that nudge the shutter blades closer together at high-speed settings. With this head start the blades travel only a quarter of the usual distance, quadrupling shutter speed. Drawback: Effective aperture (f stop) is reduced.



Radio Controls Photo Gear

You press a button on the hand-sized transmitter. Up to 300 feet away a receiver closes two circuits: one to supply house current to a receptacle on the receiver; the other in a remote cord that operates self-powered devices plugged into it.

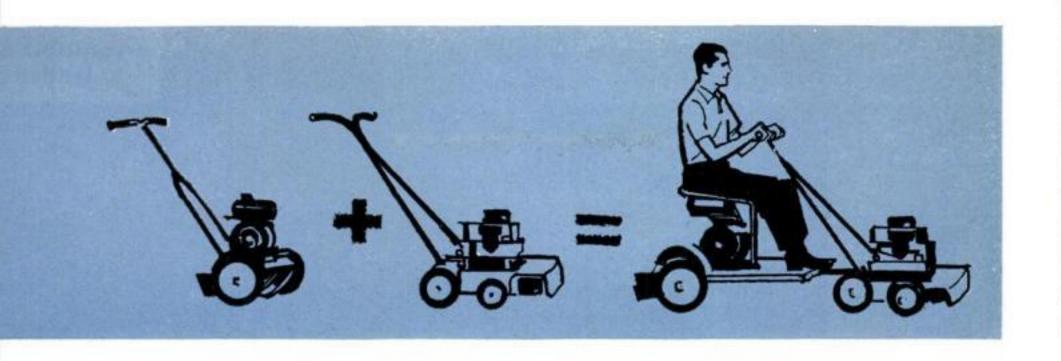
Lights, a movie projector, tape recorder or small appliance can be plugged into the receiver's receptacle. The remote cord triggers a flash gun or strobe, solenoid-equipped camera or automatic changer on a slide projector. Tiny batteries power the 3½-ounce transmitter.

Made by Tech Photo Products, Inc., 1945 McDonald Ave., Brooklyn 23, NYC, a complete set sells for \$69.95.

▶▶▶A PIECE of cellulose tape can be an unseen assistant when you're taking baby pictures. You stick it on the child's hand and shoot his changing expressions as he tries to pull or shake it off.—

Jay Elleff, Chesterfield, Ind.

138 POPULAR SCIENCE JULY 1959



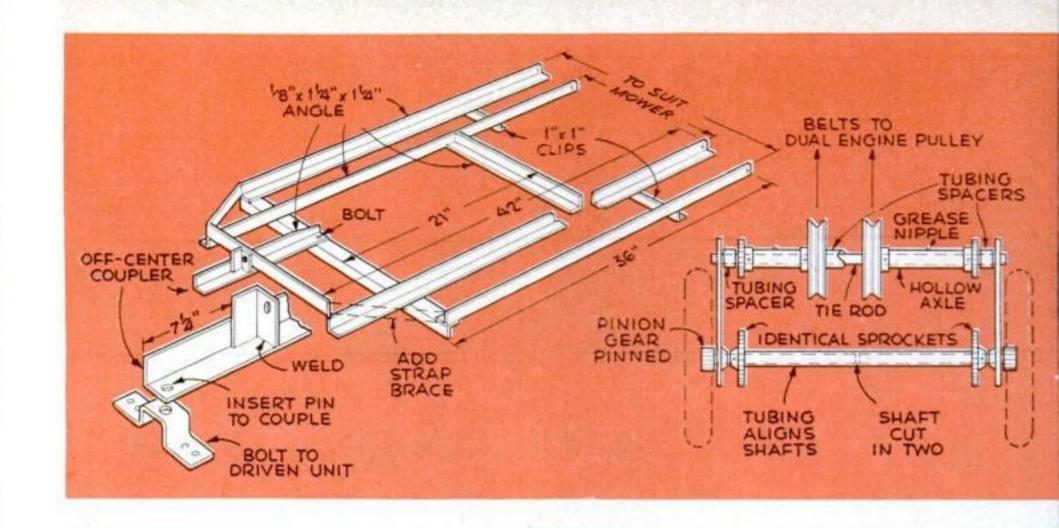
Two Mowers Can Be Better Than One

Totary mower, whereas the older self-propelled reel-type grass cutter pushes itself. Why not, mused Marion Davis of Hagerstown, Ind., combine the best features of both by hooking them up in tandem?

He accomplished this trick by mounting the frame, engine and wheels of an old reel mower on an angle-iron chassis that rides piggyback on the rotary mower. Now all he has to do is ride and steer the rig.

Two-wheel drive provides enough trac-

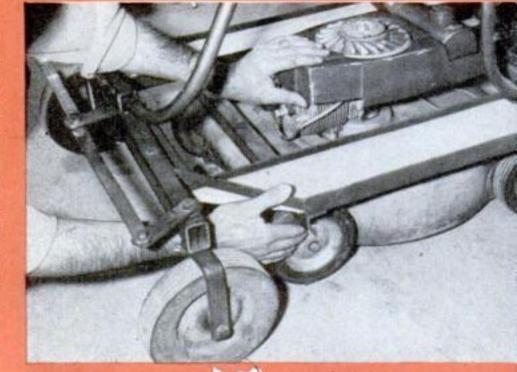
THIS TANDEM RIG makes light work of lawn mowing. An old reel-type mower in back, mounted on a riding platform, does the legwork. Adding a front axle converts the push sulky into an independent self-steering unit (see next page).

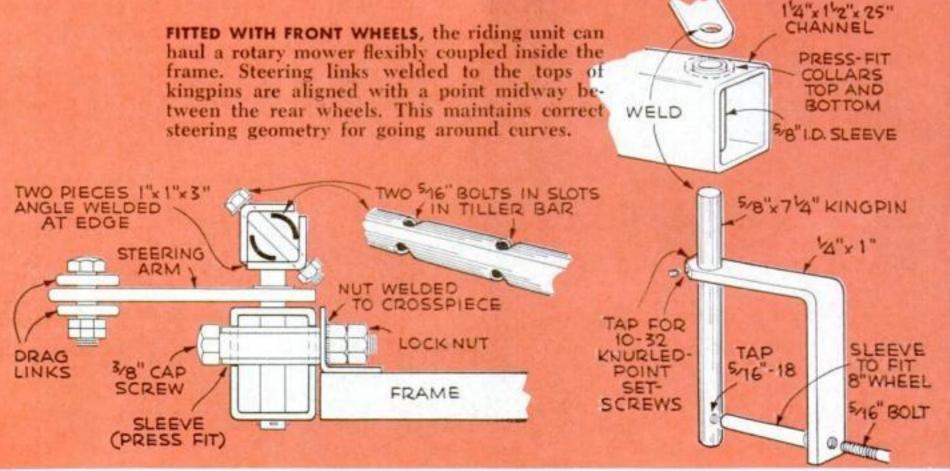


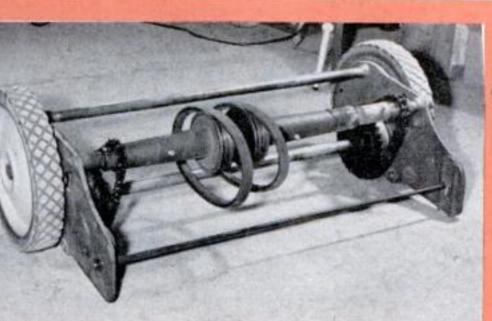
With front wheels, the power unit can roll on its own

A FRONT axle of channel steel is attached by a single cap screw, on which it can tilt to let the wheels ride up and down over rough ground. This cap screw and the steering shaft were set slightly off center to avoid interference between them.

The tiller, bent of 7/8" tubing, is clamped just tightly enough in its adjustable mount to let the rider swing it forward to get on the machine and back to a comfortable steering angle. Steering links are forward of the axle to leave more foot room and to avoid interference with the frame.







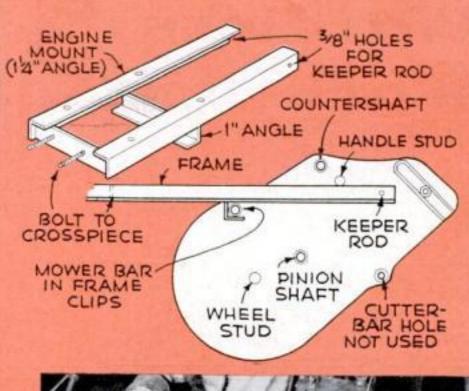
A WELDED FRAME was made to suit the spacing between the mower's side plates (at far left). To let the wheels turn independently, the pinion shaft and countershaft are both split in two. Above is the converted mower.

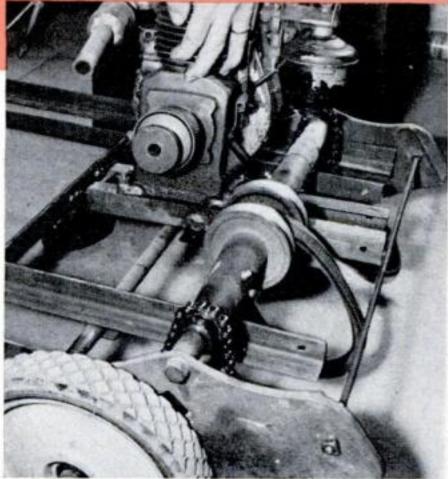
tion even on grades. Differential action permits close turns under power. It is achieved without gears by the use of a dual automatic drive pulley, which also serves as the clutch. (The type used is Duo-Drive No. 18D5B21, V-Plex Clutch Corp., 550 W. Main St., Hagerstown, Ind.) On a turn, as the inside wheel is slowed down, its belt shifts to a smaller diameter, while that of the faster-moving outer wheel goes into "high." The drive is positive and affords safe engine braking downhill.

Reel spiders were stripped off the pinion shaft. It was then cut in two and the pinion gears were pinned to the cut ends. With the old sprocket on one half and an identical new one on the other, the shaft halves were inserted in the original bearings. A length of free-running steel tubing slipped over the two half-shafts keeps their ends aligned. As the bearings were the self-adjusting kind, a compression spring was inserted between one sprocket and the cone race near it.

The countershaft, also split in two, consists of two pieces of smooth-bore pipe turning on one of the mower's tie rods. Each pipe has a 5" pulley at one end, a small drive sprocket at the other, and a grease fitting between. Spacers cut from pipe align the sprockets with those on the twin pinion shafts.

"B"-section belts, stiffer than the "A" belts commonly used, maintain their driving grip even when the automatic pulleys open and the belts drop to a

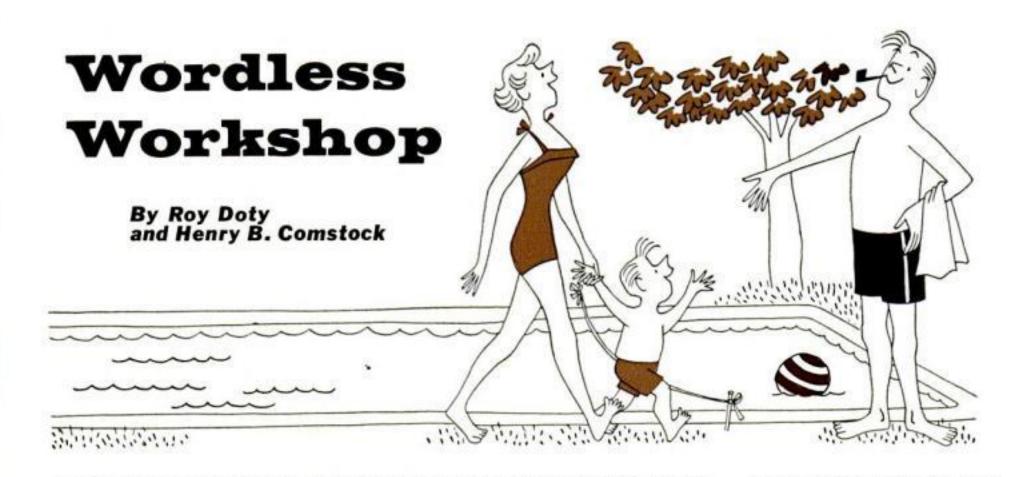


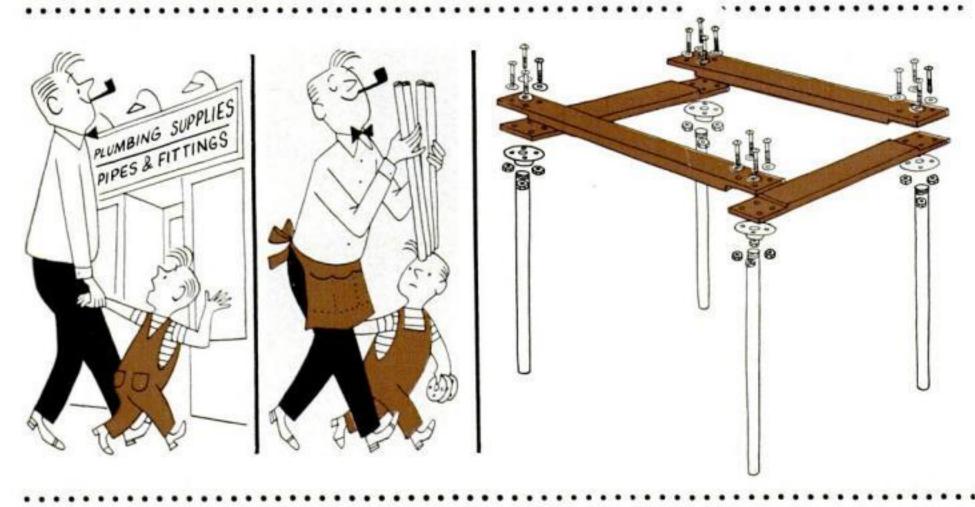


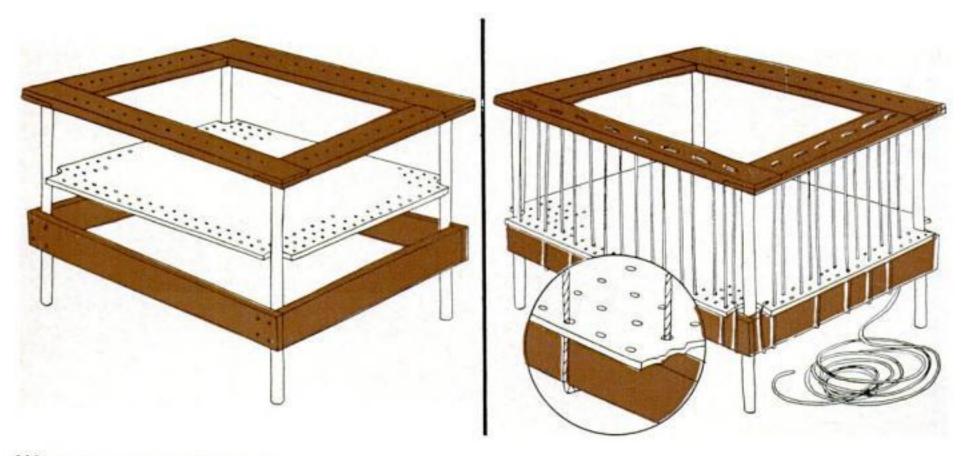
frame rails between side plates and sprockets. Front shrub bar enters angle clips on the frame, with the handle studs resting on the rails. An angle on the engine mount hooks under the shrub bar. To lock everything, a 3/8" keeper rod (not shown) is pushed through holes in all four rails, the side plates and the engine mount. Cotter pins hold the keeper rod in its place.

smaller driving diameter. No idlers are needed. A coupler bar on the sulky is engaged with a bracket mounted on the rotary mower by dropping in a pin. Foot boards were laid in the angle-iron frame.

So successful was the unit as a pusher that Davis later added a detachable front axle. With two steerable wheels, the power unit can be used for hauling rocks or bagged materials, pulling loaded wagons or light implements, or for mowing with the rotary mower inside the frame instead of in front.



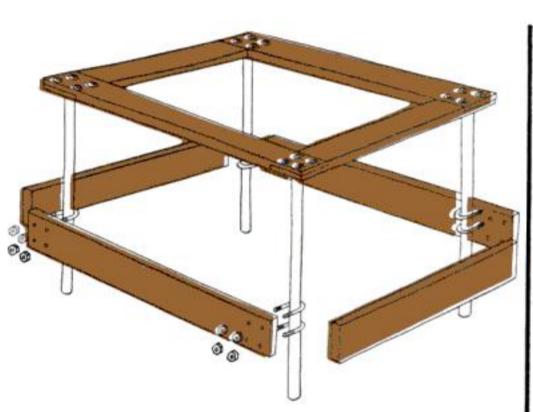






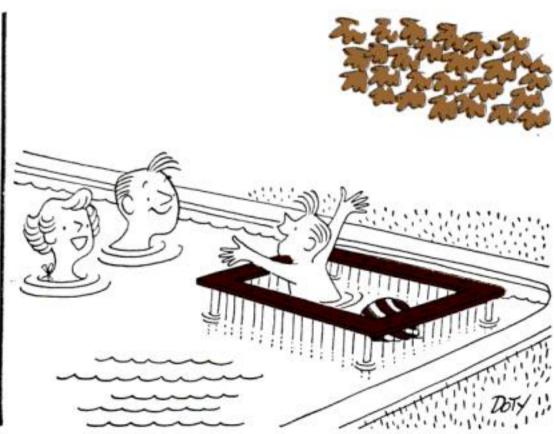












Short Cuts and Tips

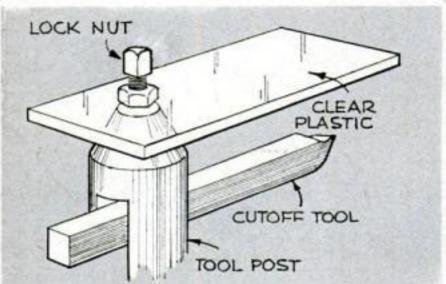
FROM PS READERS

Tin-Can Seats for Camping Comfort

Comfortable, disposable seats for use around a campfire can be made from empty tin cans. Tie or strap six or eight together and pad them with thicknesses of canvas or paper. You'll find them just the right height.

—Ken Murray, Colon, Mich.





Transparent Chip Deflector

You can protect your eyes and still see the work in a lathe with this deflector made from clear plastic. Cut a rectangle to a suitable size and drill a hole to take the tool-post hold-down bolt. Mount it with a lock nut to keep it in place.— Federico Strasser, Santiago, Chile.





You can put in new fence rails without disturbing the rest of the fence by fastening them to the post with \(\frac{1}{16}\sigma^*\-\text{-by-1}\sigma^*\-\text{-by-1}\sigma^*\-\text{-by-1}\sigma^*\-\text{-duminum angles.}\) Cut lengths to the width of the rails, and drill and countersink for brass or aluminum screws.—
\(\text{William B. Eagan}\), \(\text{Owensboro}\), \(\text{Ky}\).



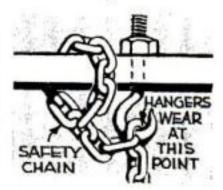
Log-Cabin Tool House

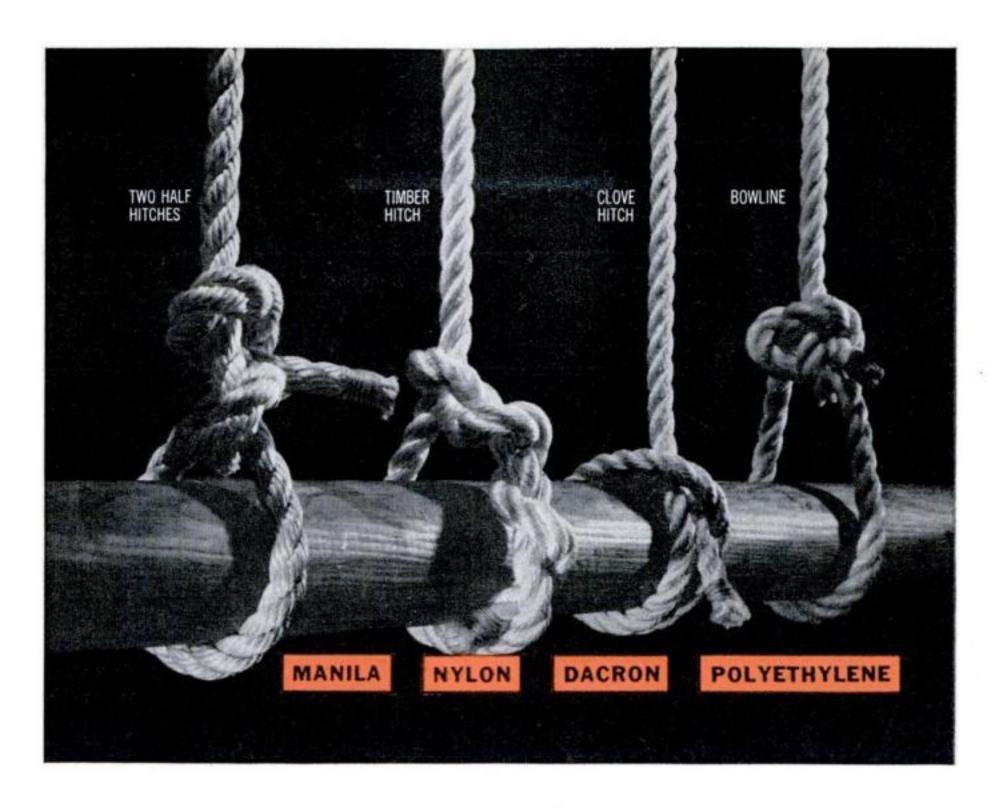
I PICKED up a truckload of waste slabs from a lumber mill for the asking and used them as siding to convert an unsightly chicken house into a decorative log cabin. It provides me with a convenient lean-to for my tractor and garden tools.—Karl J. Krausse, Rockville, Md.

Safety Chain on Child's Swing

To Avoid danger of injury to a child should the eyebolt on a back-yard swing break, you can use a simple safety device. Loop the chain ends around the crossbar, using the top link in each end to secure them. Then hang the swing by an inter-

mediate link slipped over each eyebolt. If the eyebolt should give way, the swing will drop only an inch or two.—Donald Crepeau, Calumet, Mich.





The Rope You Need for a Small Boat

By Erik H. Arctander

ROPE holds your boat alongside the dock, makes it fast to an anchor or mooring, starts the outboard motor and tows water skiers from the stern.

Buying the wrong kind or size of rope for these jobs can be dangerous or needlessly expensive. To make choosing even tougher there are new synthetics—nylon, dacron, polyethylene—in addition to manila, long the best natural fiber for marine use. Why the synthetics?

• They're from 50 to over 100 percent stronger than the same size manila.

 Neither dry rot nor any kind of marine growth can harm them.

They won't swell or kink when wet.
 Disadvantage? They cost more—three
 to nine times the price of manila rope of

the same size. But take another look.

Actually you won't pay that much more. Because it's stronger than manila, a synthetic can be thinner. And because it lasts longer, a synthetic rope may be cheaper in the long run.

Each synthetic has a unique property that makes it useful. Nylon stretches as much as 15 to 25 percent of its length under strain. Dacron is about 75 percent as strong as nylon, but stretches very little. Polyethylene, weakest synthetic, is the only rope that floats when wet.

What kind of rope to buy. The best grade of manila is treated to resist decay and lasts several seasons if cared for properly. The smallest size, $\frac{3}{16}$ " diameter, sells for about a cent a foot. The largest size most boat owners use is 1" diameter and this costs about 15e a foot.

How Rope Strengths Compare —Manila vs. the Synthetics

Rope Diameter (inches)	SAFE WORKING LOAD (POUNDS)						
	Manila	Nylon*	Dacron	Poly- ethylene			
₹6	90	210	144	130			
1/4	120	360	240	210			
%	200	550	374	310			
3/8	270	760	520	420			
7/6	350	1,040	714	540			
15/32	450	*	*	*			
1/2	530	1,380	900	720			
%6	690	1,720	1,120	830			
5/8	880	2,080	1,380	1,080			
3/4	1,080	3,000	1,900	1,400			
13/6	1,300	3,400	2,200	*			
7∕8	1,540	4,000	2,520	1,900			
1	1,800	5,360	3,300	2,400			

*Including rope made from Caprolan (a type of Nylon)

★Not made in this size

When boating is only an occasional thing, and you take care of your lines, manila is the best buy. Just make sure it's strong enough for the job.

For heavy use the synthetics pay off. They last four to six times as long as manila. Only actual wear, particularly abrasion, shortens their lives.

Nylon is the best all-around synthetic for boat use. Its strength, stretchability and resistance to decay make it ideal for mooring pendants, dock lines, anchor lines and motor starter ropes.

Mooring pendants. A chain is the strongest, least expensive connection between a mooring and a boat. But chain is hard, even dangerous, to handle at the boat end. So a nylon pendant should be attached to the chain a few feet below

the water. If a mooring buoy is used, make the pendant fast to its top.

Pendant thickness depends on the boat's size and weight. For open boats up to 21 feet, use \(^{5}\/_{8}''\) nylon or \(^{3}\/_{4}''\) manila rope. Pendant sizes for longer boats are given in the table on the facing page. You can use standard lay rope for pendants, but mooring-line lay is better—if your supplier has it. It has greater resistance to abrasion.

Dock lines. Half-inch manila rope will hold most small boats. And theoretically the same job can be done by a 3/8" nylon line. But in practice such a thin rope would be worn through by rubbing against boat and dock. So a nylon dock line needs to be thicker than is required for strength alone.

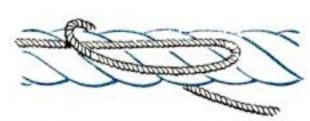
The anchor line. Your anchor should be on the end of a line long enough to reach the bottom three times over. This is generally safe for a few hours. In a storm or when the hook is out for several days, the line should be increased to five times the depth of water. Greater length of line reduces the shocks that might tear the anchor loose and keeps the pull on the anchor closer to the horizontal.

Motor starter ropes are commonly made of nylon because it is strong and will stretch. When made for this purpose the nylon strands are laid up extra hard (tight) to reduce wear. Five sizes of starter ropes are used, with the 9/64" one the most common. A spare one is good insurance.

Dacron is used largely in the running rigging of large sailboats because of its strength, decay resistance and lack of stretch under tension.

Polyethylene has the unique ability to float indefinitely; it can't get waterlogged. Water-ski ropes are commonly 75 feet of 1/4" polyethylene. Polyethylene is also

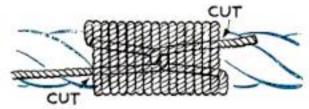
Before using a new rope, put whippings on the ends. Here's how



LAY A LOOP OF SAIL TWINE or cotton fishline on the rope. Then take turns around it with the long end of the twine, wrapping tightly so each turn is snugly against the one before.

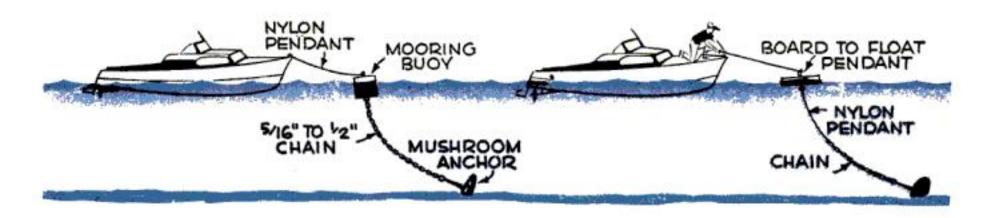


when Length of whipping equals the rope's diameter, poke the long end of the twine through the loop that is still exposed. Keep pressure on this end while you grasp other end.



PULL ON THE SHORT END. This will draw a loop of the long end under the turns, where the two loops are linked. You cut the rope 1/4" away from the appropriate edge of the whipping.

45 POPULAR SCIENCE JULY 1959



What Anchor Line for Your Power Boat?						Mooring Pendant?	
LENGTH OF	LENGTH OF ANCHOR LINE (feet)		ROPE DIAMETER (inches)		ROPE DIAMETER (inches)		
BOAT (feet)			Manila	Nylon	Manila	Nylon	
Under 20	Working Anchor	100	1/2	3/8	3/4	5/6	
	Storm Anchor	100	1/2	3/8			
20 to 25	Working Anchor	100	1/2	3/8	1	13/16	
	Storm Anchor	150	5/8	1/2			
25 to 30	Working Anchor	100	5/8	1/2	11/4	1	
	Storm Anchor	180	3/4	%6			
30 to 35	Working Anchor	125	3/4	%6	150	11/0	
	Storm Anchor	200	1	3/4	1%		



suitable for heaving lines and dinghy painters. It comes in many bright colors.

Proper care of your rope will insure that you get your money's worth out of it. Start this by whipping the ends right away. If left unwhipped, the strands unlay and weaken the rope. An alternative treatment for nylon is to hold a cigarette lighter under the cut end and let the fibers melt. They fuse together, forming a hard knob that prevents unlaying.

It's best to whip a line first, then lay it flat on a hard surface and cut through with a sharp knife or razor.

Manila rope needs fresh air and sunshine to dry out between uses or it rots. Synthetics need little attention; they can be stowed away wet. Nylon does, however, have two enemies: Flame melts it and sharp edges cut its fibers.

You can protect vulnerable parts of a

nylon rope from abrasion with chafing gear. Sew a piece of heavy canvas or leather around it or slip on a piece of rubber hose that's been slit lengthwise. Bind the hose in place with copper wire.

If you store rope at home, try to keep it out of attic or basement. Use a dry place with moderate temperatures.

When to replace rope is something you can't always tell by outward appearance. To test manila, for example, you open up the strands by twisting them against the lay. If there is rope dust between the strands, or broken fibers, the line should be replaced. Synthetics don't deteriorate; they wear away. Only large numbers of cut fibers need retire them.

Old rope too weak for one job may still handle a less demanding one satisfactorily. A discarded anchor line, for example, could make several dock lines.

Short Cuts and Tips

FROM PS READERS

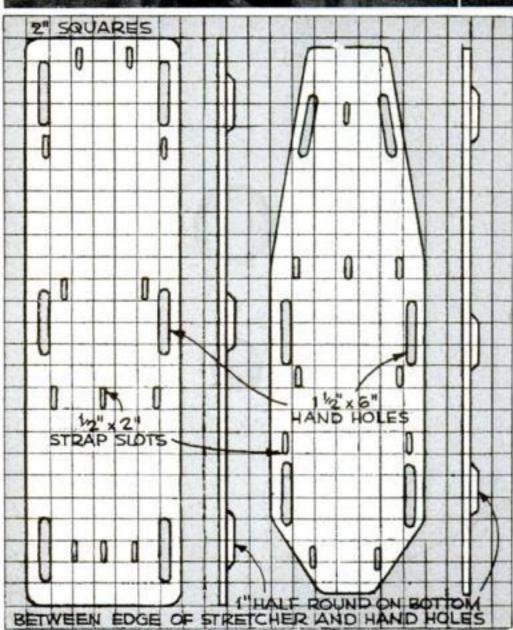
Greased Bulb Won't Stick in Socket

When I replace a light bulb in a socket that is exposed to the weather, such as one on a porch or outdoor post, I rub a tiny dab of petroleum jelly over the threads. When it burns out, it is easy to unscrew.—John R. Hennen, Chicago.







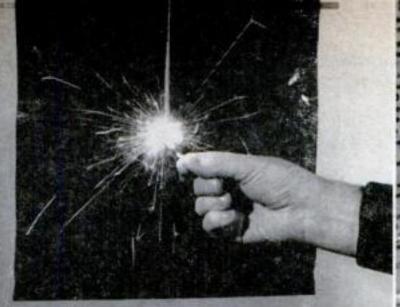


Plywood Stretcher Rides on Auto Seats

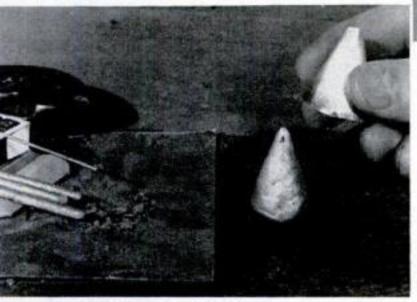
A STRETCHER that will convert your car into an emergency ambulance can be built of \(^{1}/_{2}''\) or \(^{3}/_{4}''\) plywood. Alternative designs are shown in the drawings at left.

Hand holes for four to six bearers are cut through the board as are several smaller holes to take straps, ropes or bandage for tying the patient down so he won't fall off. If ½" plywood is used, stiffen the board between the hand holes and edges with 1" half-round molding glued to the bottom.

Such a stretcher is especially good for taking a person with a back or neck injury to a doctor. After he is tied on, the stretcher is lifted through the back door and over the front seat, then rested on the backs of both seats.—C. Donald Barnum, West Glacier, Mont.



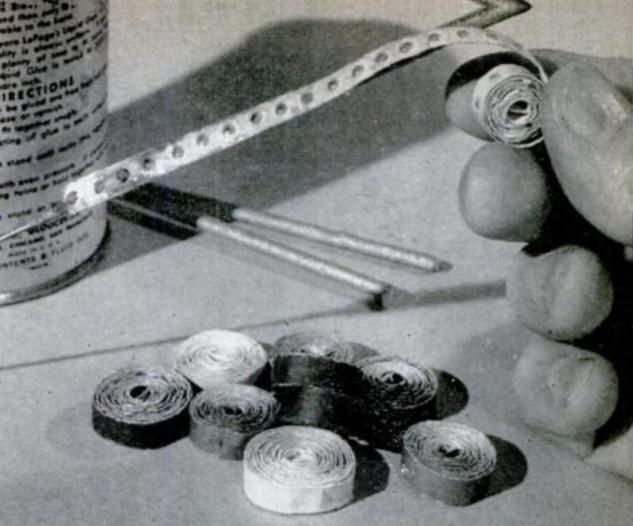
filtered fire. Displaying sparklers through colored cellophane gives their flames any hue you wish. A yardstick makes a convenient holder. Drill a small hole in it to grip the sparkler's end. Picture above shows one being lighted.



from a number of sparklers with pliers and moisten it with just enough water so it can be shaped into cones. (A form rolled from tin speeds the job.) Let the cones dry; then set them on a sidewalk or stone and ignite the tips for sputtering pyrotechnics.



ADD COLOR. Wipe a thin coating of glue or mucilage on sparklers and then dip them in these materials for special effects: bronzing powder (green flame), baking or washing soda (yellow), aluminum powder (intense white).



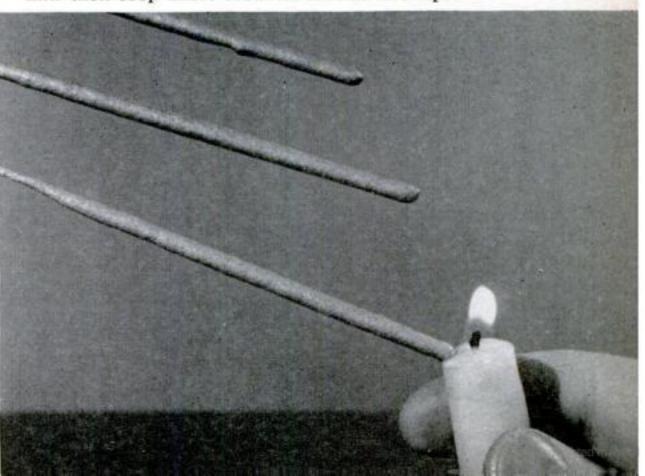
ADD SOUND. To make sparklers spit, snap and crackle, glue strips of unperforated pistol caps to their sides. Apply glue lightly to both faces of the strips and be sure the glue is dry before lighting the sparkler.

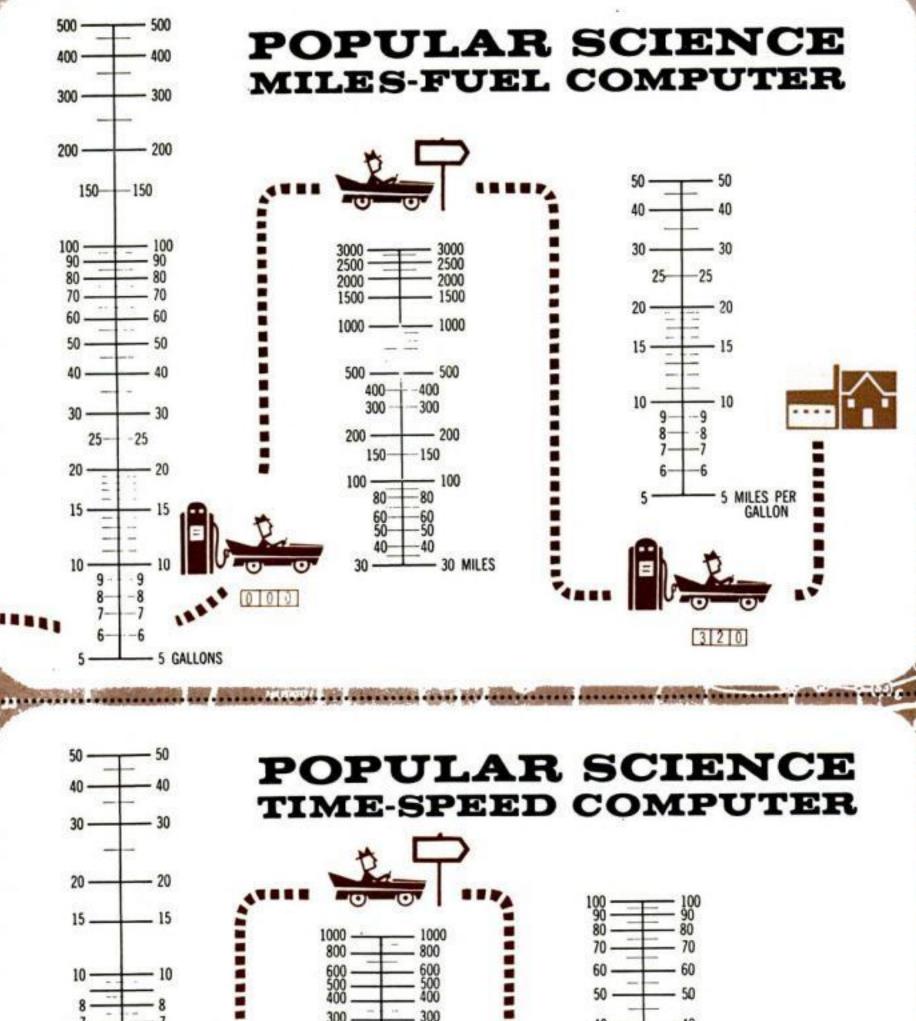
For more fun on the Fourth:

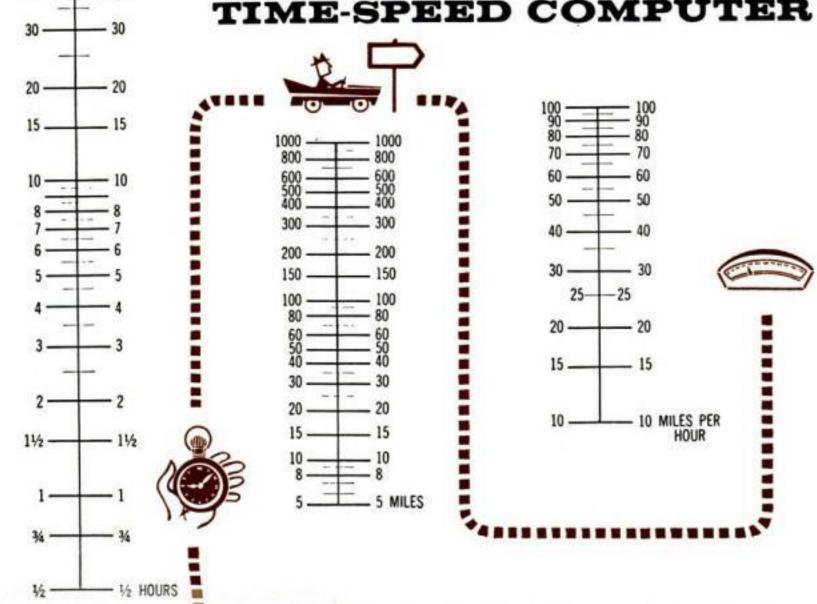
5 Stunts with Sparklers

By Ken Murray

QUICKER LIGHTING. Prepare sparkler tips for fast igniting (even in a breeze), by soaking the tips in hot candle wax. Or dip pipe cleaners in melted paraffin, let them cool, and then loop short sections around the tips.







Blad Crerk

ar dale

39.

Ctto

(1017118)

Canistro

Alie mild

Altree Sal

1/8 60

iid.

Glove-Compartment Computer

OING on an automobile trip? Then it's convenient and fun to be able to make certain basic travel estimates quickly and accurately. These, for example:

 How long it will take you to get from X to Y at a given speed.

Your average speed.

 How many miles you're getting to the gallon.

 What points on your trip you'll have to head in for gas.

The computing scales on the opposite page will give you this information instantly. Known as nomograms, they are so easy to use that if you're motoring with small fry you can keep them happy coming up with the right answers.

Fold along this dotted line before trimming to size

How to make it

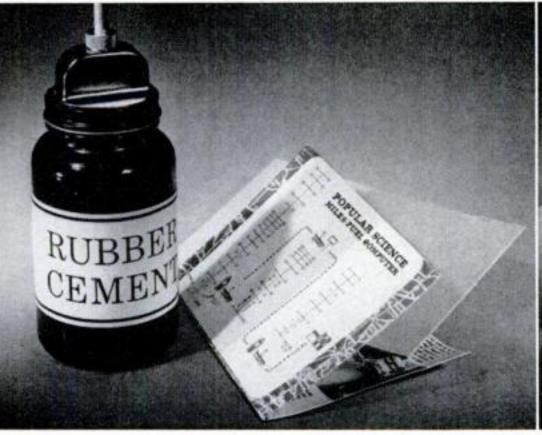
SANDWICH STIFF CARDBOARD between the backto-back nomograms and glue it in place. Round the corners; they're less apt to get dog-eared when you tuck the computer in your glove compartment. To prevent soiling, you can insert the card in a cellophane envelope. Here's a sample of how these nomograms work: Your speedometer shows that you've driven 600 miles on 40 gallons of gas. Lay a pencil, road map, or any other object with a straight edge across the miles-fuel computer, to pass a line through 40 on the gallons scale and 600 on the miles scale. The continuing line will cross the miles-per-gallon scale at 15. That's it—your average fuel consumption. Conversely, if you're planning a 600-mile trip, and know that your car gets 15 miles to the gallon, the line tells you that you'll use 40 gallons.

For calculations involving time, the other computer works the same way. If you expect to travel 330 miles at 55 miles per hour, how long will it take? A line from 55 m.p.h. through 330 miles shows you'll drive six hours.

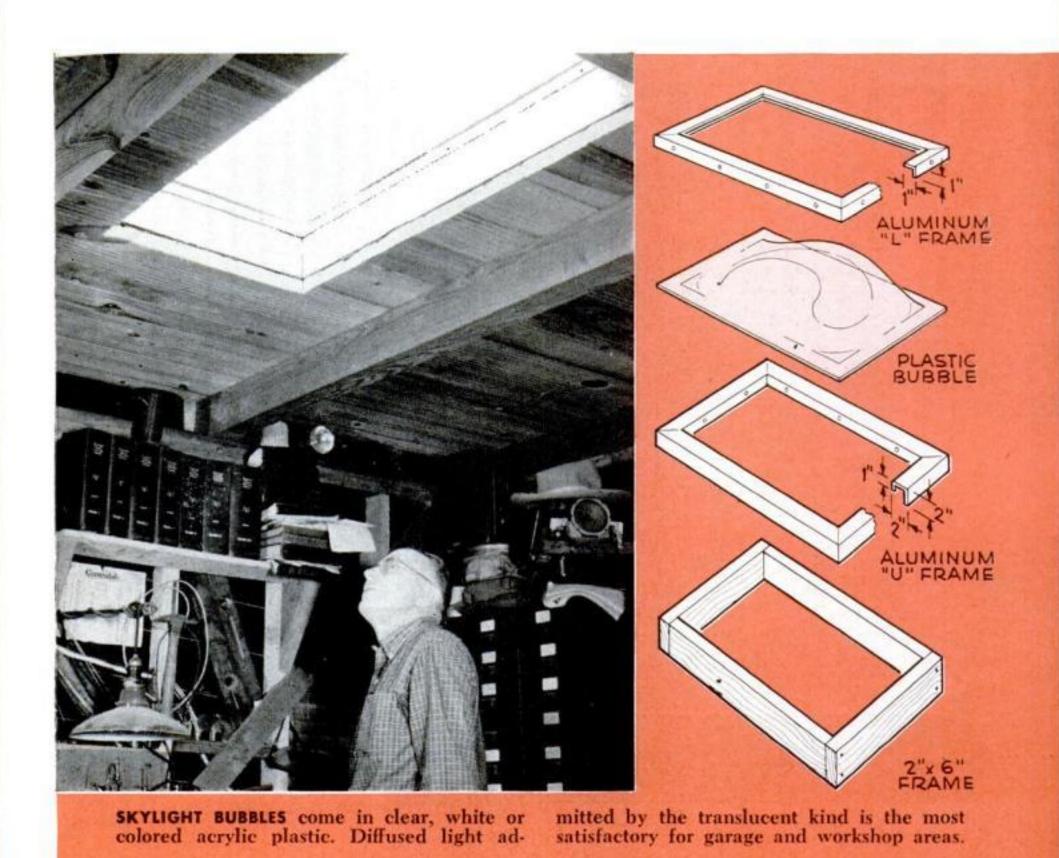
For convenient reference, tear out the opposite page and convert it into a back-to-back computer as shown below. Store it in your glove compartment.

How to use it

A CONVENIENT STRAIGHTEDGE for aligning the two known figures, when driving, is a road map. Where the edge crosses the third column you'll find the desired figure. Numbers are placed on both sides of each column so the map won't obscure them, whichever way it's tilted.







What you should know about how to choose and—

How to Install a Plastic Skylight

SET in the roof of a workshop or garage, a skylight will give you the best possible illumination. It may offer another advantage. If you've been relying on regular windows, you can convert them into useful shelf or cupboard space.

You can install such a skylight easily, using prefab units consisting of a plastic bubble and a pair of aluminum framing members.

Unlike glass, these bubbles won't shatter under the impact of hail or a plummeting baseball, or deteriorate with age, as glass-fiber panels may. That's because they're made of acrylic—a synthetic resin that's closely related to the ones used for plane canopies. Equally important, the aluminum framing members get a broad bite on the plastic, insuring a snug water seal.

Bubble skylights come in a number of sizes, with prices averaging \$4 per square foot. Figure that each square will spread illumination over about 10 square feet of floor space. The model shown here measures 28" by 52", and gives ample light for an 8'-by-12' area.—Paul Corey.



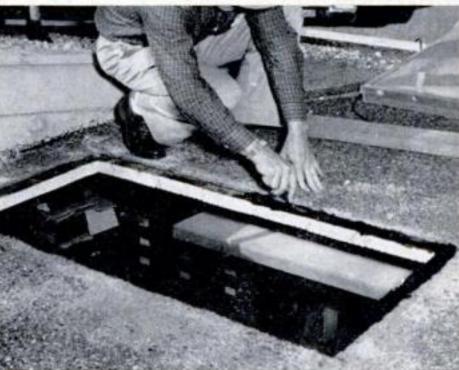
1 drive two nails through the roof deck from below. The nails should indicate one side of opening to be cut, or a side and corner location.



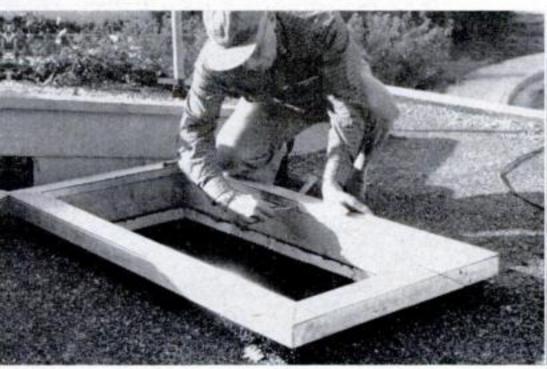
2 MAKE A TWO-BY-SIX FRAME dimensioned to take the skylight assembly. Position it with nails and cut around it—right through the roof covering to the wood deck below.



3 REMOVE FREED SECTION of roof covering, replace the frame and scribe around its inner edges. Saw out this deck area. If you must cut a rafter, support the ends with headers.



4 SCRAPE BACK GRAVEL for about 10" on all sides of the opening and cover the narrow strip of exposed deck with a thick coat of asphalt cement. Nail frame securely in place.



5 PAINT FRAME SIDES and scraped areas with asphalt cement. Embed heavy building paper, nailing at 3" intervals. Apply more cement and regravel. Attach aluminum U frame.



6 LAY THE PLASTIC BUBBLE on the aluminum U frame. Then place the retaining frame over it, bringing its edges down over the lower frame. Secure it with screws, as shown.

How Spigots Keep Cellar Dry

When numerous coats of sealer failed to keep water out of my basement, I solved the problem with what I call "controlled leakage." At four points along the floor line I drove holes through the inner sides of the concrete wall blocks and inserted pipe and spigot assemblies. Each has a 3"-long nipple sealed in the hole with water plug cement. A pair of elbows and two shorter nipples place

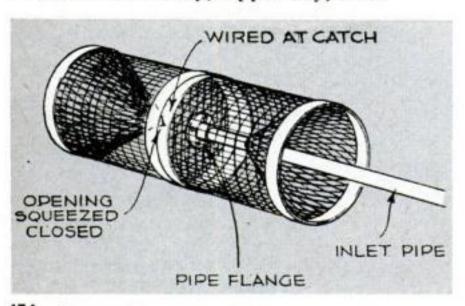
the spigot in the clear for convenient hose coupling.

During wet weather I turn on the spigots periodically. If water flows I attach the hose and run it to a floor drain. This has worked so successfully that what was once 28 by 40 feet of unusable basement is now an attractive game room (photo at right), workshop and utility area.— Clifford J. Jacobs, Springfield, Ohio.

Minnow-Trap Water Strainer

You can strain water for a camp or farm by attaching a fisherman's minnow trap over the end of the supply pipe. Push the strainer on the pipe through one of its openings and install a pipe flange to keep it from sliding off. Then squeeze together the opening at the other end and wire the halves together at the catch.

—Victor H. Lamoy, Upper Jay, N.Y.



SPIGOT WITH
HOSE THREAD

1/2" X 1"
NIPPLE

1/2" ELBOW

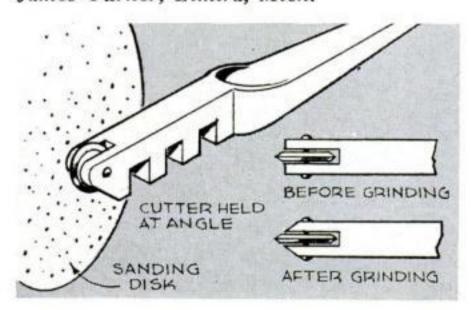
WATER-PLUG
CEMENT
GARDEN
HOSE
FLOOR
DRAIN



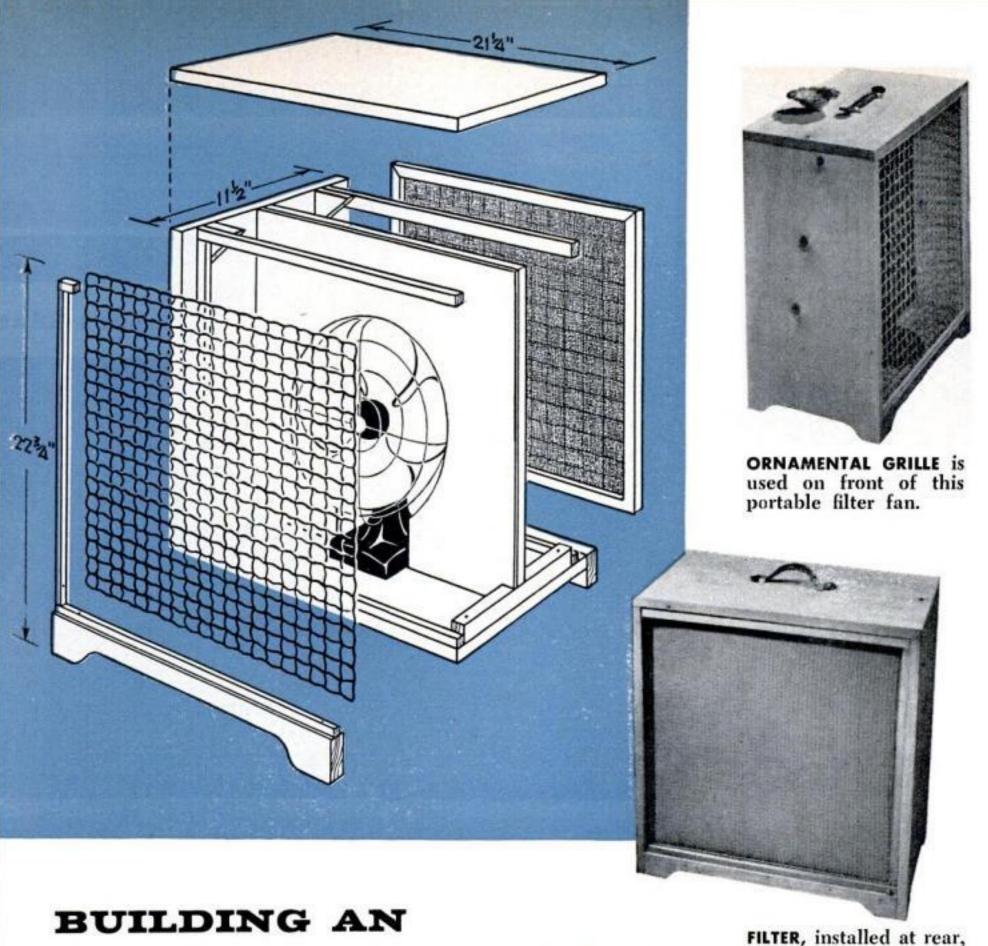
Sharpening a Dull Glass Cutter

HAVING a lot of glass to cut and only dull cutters in my bench, I tried sharpening one. It worked fine. I placed the cutter against a sanding disk at the angle of the wheel and ground the metal handle to this angle, pressing hard when the wheel began to turn to finish the work. Then I repeated for the other side.—

James Turner, Elmira, Mich.



154 POPULAR SCIENCE JULY 1959



BUILDING AN

as above, determines the Electrostatic size of the cabinet. Pollen Catcher

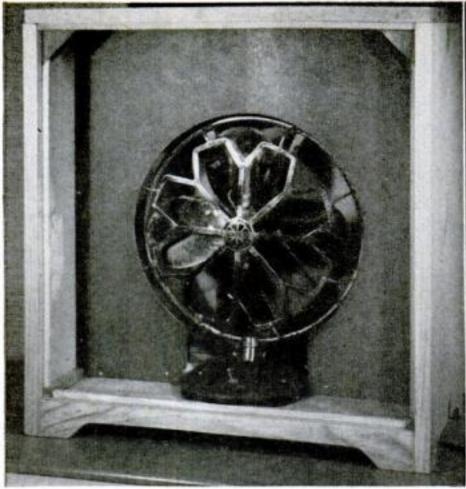
By Walter E. Burton

OMBINE an ordinary fan with an electrostatic furnace filter and you A have a home appliance that cleans the air as it cools you. Static electricity plucks dust from the air, traps irritating pollen, even filters out particles of cigarette smoke as tiny as 1/75,000 of an inch.

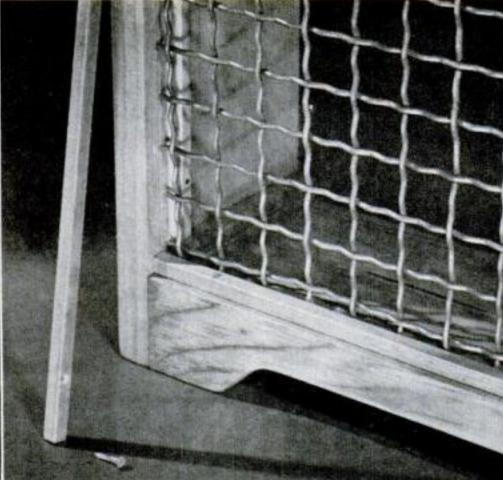
One portable cleaner will keep air fresh in an entire room. During the day, you can use it in the living room or kitchen, then at night carry it into a bedroom. Pollen sufferers who are bothered most at night can keep it running while they

Static Electricity Traps the Dust PLASTIC COMB rubbed THE CHARGED COMB will attract bits of on coat sleeve shows how filter works . . . paper, dust and dirt. IN FILTER, moving air CHARGED FILTER pulls builds up static charges fine dust, dirt, pollen out of the moving air. on shredded plastic . . .

CONTINUED



BAFFLE of 1/8" hardboard increases efficiency of the fan. Cut the opening to fit closely around the fan without touching it. Screw the baffle to cleats at the sides, top and bottom.



A GRILLE IMPROVES APPEARANCE. Large-mesh aluminum hardware cloth shown is adequate, but expanded metal would conceal fan better. Half-inch strips hold the grille in place.

Corner details of the pine cabinet

sleep. If the fan is reasonably quiet, the unit makes little noise.

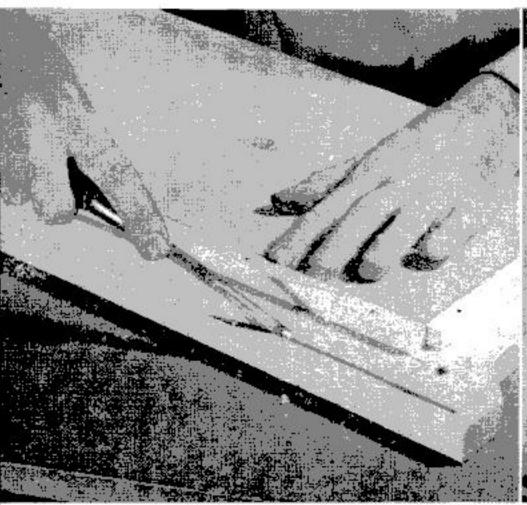
The inexpensive, homemade cleaner is built around a permanent type of filter developed by Goodyear Tire and Rubber Company for furnaces and air conditioners. The element of a Pliotron filter consists of woven strands of polyethylene plastic.

This material attracts and holds dirt particles the same way you can pick up bits of paper with a fountain pen or comb after rubbing it on your clothing to build up a charge of static electricity.

In the filter, air friction against the plastic helps keep it permanently charged. The dirt particles stick to the charged material while clean air passes on through. When the filter gets dirty, you take it out and vacuum it or wash it in detergent to remove the accumulation. Given reasonable care, a filter should retain its powers and usefulness for years.

The portable air purifier can be built around almost any fan. It also can be made to fit in a window to filter incoming air.

Basic design is a simple box open at front and back. The size is governed by the size of the filter and fan to be used. For an average room, Goodyear recommends a 20"-by-20" filter, selling for \$8.95. For a smaller room, such as a





SHORT GROOVE, near bottom of each side piece, receives end of strip that locks filter in (see photo, right). Make groove 3/16" wide by ½" deep, spacing it 1" from the filter stop-strip.

FILTER LOCKING STRIP, %" by ½", has ends cut down to 3/16" to slide into the grooves cut in cabinet sides. Upper retaining strip is fastened permanently and filter slid under it.

darkroom, a 10"-by-10" size at \$5.25 is adequate. There are five sizes between these two, and a larger 20"-by-25" size at \$9.95.

The filter is installed behind the fan so air is pulled through it rather than blown through. The open front can be covered with a decorative grille, expanded metal or large-mesh hardware cloth to improve the appearance of the cabinet and keep fingers out of the fan.

The cabinet illustrated was built from 3/4" knotty pine and finished with Minwax Puritan Pine Flat Finish No. 18. Construction was kept simple—butt joints reinforced with cleats and corner blocks. All fixed stop-strips holding the filter and grille were fastened with glue and brads.

A desk-type fan was bolted to the base of the cabinet, about in the center, and a baffle of \(^1/8''\) hardboard was cut to fit closely around it. After locating the fan, the baffle was fastened in place with cleats. A window fan, instead of the desk type shown, could be bolted to the baffle, and the baffle opening cut to fit.

The fan cord is brought through a hole in the bottom of the cabinet. If its plug is molded on the cord, bore a hole large enough to pass the plug through, then wrap foam rubber around the wire to pack the hole.

The cabinet can be fitted with a carrying handle if you plan to use it in several rooms, or it can be left without a handle and used as an end table in a permanent position in one room.

New Index of PS How-to-Do-It Articles Is Now Ready

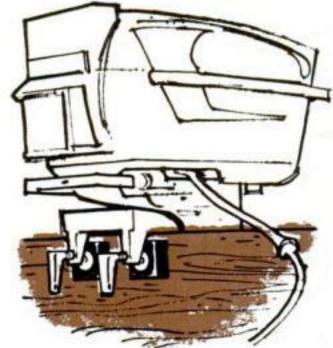
DO YOU file away each issue of Popular Science Monthly? Would you like to be able to refer with ease to articles of particular interest?

You can do so with a new index. It covers all items that have appeared in the Mechanics & Handicraft section for the past year, from July, 1958, through June, 1959. To get the Index, send 10 cents in coin or stamps for handling and postage to Index Editor, Popular Science Monthly, 355 Lexington Ave., New York 17, N. Y.

5 Boating Tips

remporary patch for a leaking spot in a hull can be made by soaking cloth in a resorcinol resin glue. You sand around the hole first, to ensure a good bond, then lay on the patch. After hardening for a day in warm sunlight, the patch becomes strong and watertight.





be improvised, if there's a leak, with the plastic rubber that comes in a tube. You spread several thin layers of the coating in the channel, all the way around. Let each layer dry, then add another until the gasket is thick enough to ensure a firm seal.

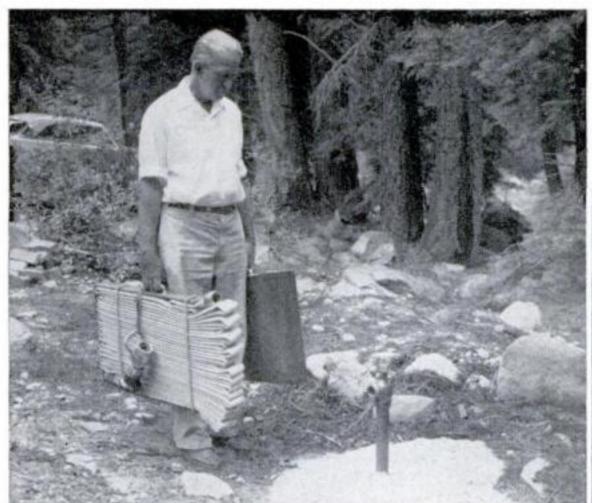
shock-mount your outboard motor by tacking a pair of rubber caster cups (made for furniture) to the inside of the transom. Tightening the motor's screw clamps on the cups will keep the wood from being marred and help reduce transfer of motor vibration to the boat.



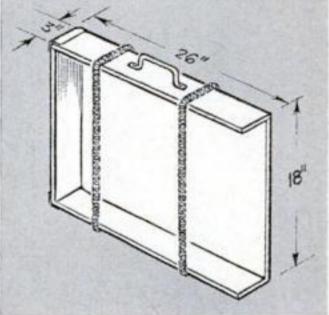
A FAST CALKING TOOL can be made from a one-foot length of bandsaw blade. It should be at least 1/4" wide and have the teeth ground off. After placing a foot of calking in the seam, cover it with the edge of the blade. Then tap lightly along the full length of the blade with a wooden mallet to seat the calking properly.



WHEN YOU ARE ROWING, here's a trick for keeping water from running down the oar into the boat—or your lap. With a length of heavy cord, take several turns around the oar, just outboard of the rowlocks. Tie the cord with the knot on the oar's underside and leave an end hanging down to carry off the dripping water.



Short Cuts and Tips FROM PS READERS



Plywood Fire-Hose Carriers for Use in Rough Country

To get hose quickly to a hydrant near our mountain lodge in case of fire, I made several carriers from 1/4" plywood. They are built like shallow boxes with one end and the front open. A 100' hose in each is

►►►A DISCARDED nylon stocking is excellent for straining lumps and crust out of paint. Cut an 8" to 10" length from the top, close the cut end with a knot and fit the other over the can, rolling it on the rim.—Mrs. Alfred Rhode, Appleton, Wis.

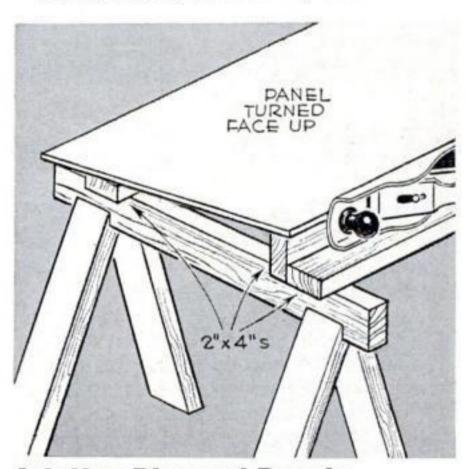


Emergency Knife Sharpening

Camping knives can be well sharpened with no more equipment than two round stones picked up from the ground. The trick is to hold them tightly together between thumb and fingers while they rest on a piece of wood or other support -never on the palm of the hand. Slip the knife into the arch of the hand and draw the edge back and forth between the stones.—Ken Murray, Colon, Mich.

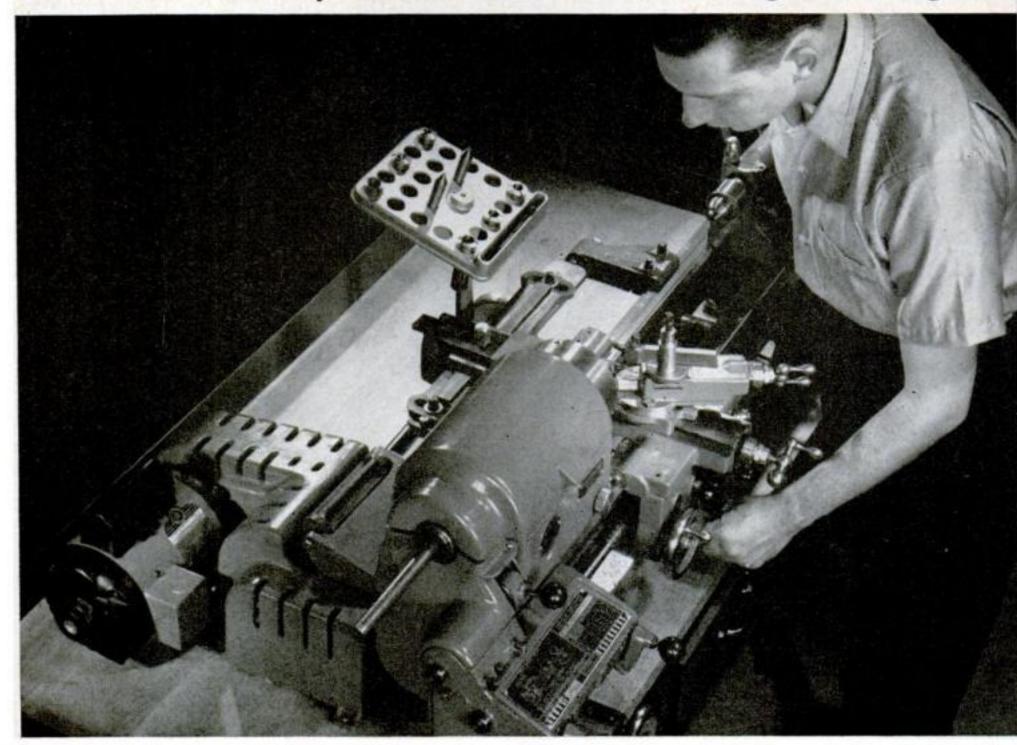
held in by screen-door springs attached at the back. A handle on top helps transporting. Loaded, a carrier weighs between 35 and 45 pounds, depending on the hose.

—E. C. Jerauld, Sacramento, Cal.



Jointing Plywood Panels

When you butt factory edges of 4'-by-8' plywood sheets for paneling a room, they rarely make a good joint. I plane the edges first, giving them a very slight bevel. As a jig I use three 8' lengths of two-by-four laid across a pair of sawhorses, two of them flat and one on edge to produce the bevel when the side of the plane rides along one of the flat pieces. -E. Bracktendorf, Lemay, Mo.



Shop-Use Report on Delta's New Lathe

By Herbert R. Pfister

In The current shower of new tools, Delta's 10" metalworking lathe is a standout for one big reason. It's not just a redesigned model, but rather the first metalworking tool for the home-shop market made by Delta, a name long associated only with woodworking tools.

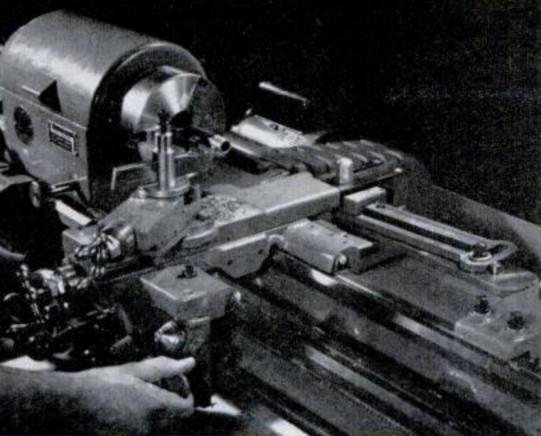
I spent several hours putting the lathe through its paces, and I can affirm that it's an easy tool to fall in love with. An infinitely variable speed control permits fine adjustment of spindle speeds from 50 to 1,500 r.p.m. without changing belts. Speeds are calibrated for direct drive and back gear on a dial behind the handwheel that controls the variable pulley. Cranking the handwheel from low to high

speed is, in itself, an experience. As the spindle speed increases, the whine of the preloaded headstock bearings goes up in pitch, until at 1,500 r.p.m. you feel that you have a turbojet by the tail.

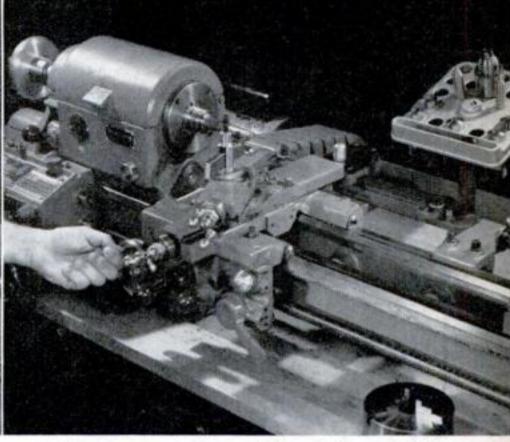
The new lathe is husky. It is a massive, industrial-type machine at a price within reach of the serious home machinist—\$645. Long stock, up to $\frac{15}{16}$ " diameter, can be passed through the big headstock spindle, and stock up to $\frac{3}{4}$ " can be gripped in precision collets made for the spindle. The extra-wide, $6\frac{7}{16}$ " bed has precision-ground V ways. Its length permits work up to $24\frac{1}{2}$ " long to be mounted between centers.

The carriage resembles a control panel. Besides the compound and cross-feed cranks, and the carriage-advance wheel,

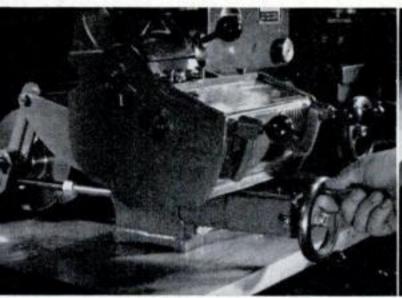
out a deluxe metal lathe. So a PS editor decided to try it . . .

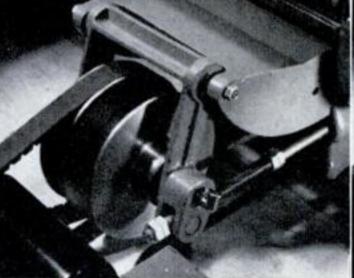


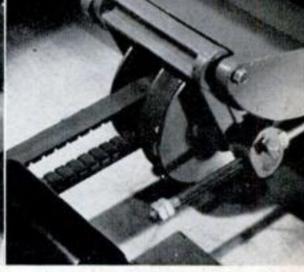
in diameter to be fed through it for continuous cutoff operations. Here a length of ½" I. D. pipe is being taper-threaded. Taper attachment permanently bolted to bed guides cross feed.



LARGE-SIZE 4-C COLLETS grip stock up to 34". The taper for the collets is ground directly into the spindle, providing greater accuracy and larger capacity by eliminating the tapered collet-closing sleeve and spindle nose cap.





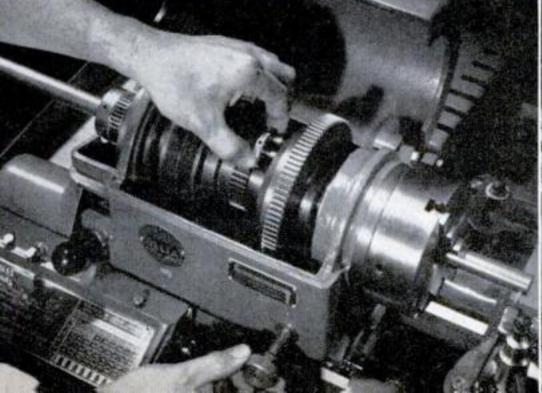


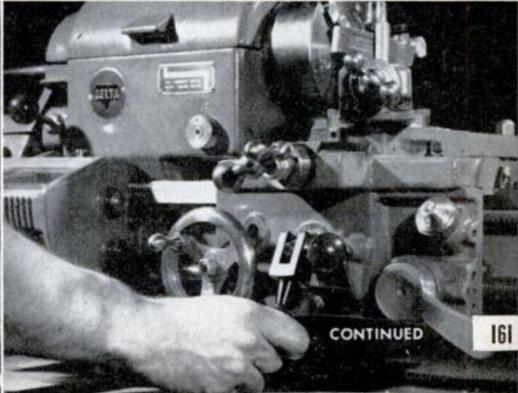
VARIABLE SPEED CONTROL is cleverly applied to the new lathe. A handwheel moves the floating variable-pitch pulleys back and forth between the motor and lathe to constantly vary the ratio.

The low-speed position (center photo) drives the spindle at 250 r.p.m. The high-speed position (right) gives a top speed of 1,500 r.p.m. Back-gear range is 50 to 250 r.p.m.

SHIFTING TO BACK GEAR is more convenient. A large head on the direct-drive locking pin is easy to find and pull out. A pull-rod at the front of the headstock moves an eccentric that brings the back-gear drive pinion into mesh.

SAFETY CLUTCH on the carriage apron can be adjusted for a light grip that will slip if the carriage is overloaded on power feed or if it accidentally travels into the head- or tailstock. The clutch lever here is shown engaged.





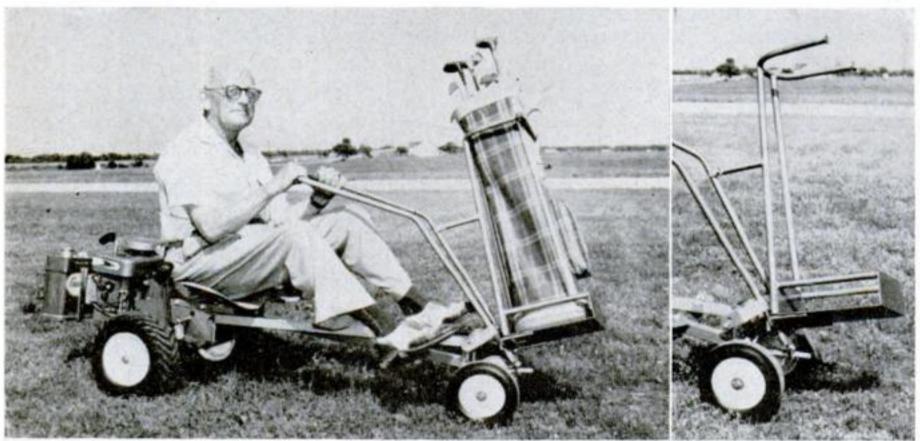
there's the thread dial and half-nut lever, a three-position feed selector and a clutch lever. With the selector in one feed position, the clutch starts and stops the power cross feed. In another position the half-nut lever can be engaged without using the clutch, and in the third position, the clutch controls carriage travel at half the threading lead for a fine cut under power. The clutch can be set to slip when overloaded to protect the lathe from strain. If you should inadvertently allow the carriage to feed itself into the headstock when threading, a shear pin in the lead-screw drive will

snap, preventing heavy damage to the gears, lead screw and half nuts.

Two levers on a quick-change gearbox provide an instant selection of 54 feeds or thread pitches. A thread chart and lubrication chart are mounted on top of the gearbox for ready reference.

The tailstock ram is calibrated in sixteenths of an inch, and an adjustable micrometer collar on the tailstock handwheel permits accurate control of drilling depth to .001". The entire tailstock casting can be set over on its base \frac{11}{16}" in either direction for turning long tapers between centers.

Happy Golfer Rides Converted Sulky



BY WELDING a tubular golf-bag carrier and a fuel-can rack to his Lawn-Boy garden sulky, Marion Collins of Lamar, Mo., covers 18 holes without effort at a brisk four miles an hour. Weighing less than 100 pounds, the wide-tired vehicle can be driven anywhere on the golf course without damaging the turf.



162 POPULAR SCIENCE JULY 1959

Scratch, Scratch. Who's There?

To keep our dog from gouging the wood each time he scratched on the door to come inside, my husband nailed a sheet of tin over the lower part of the frame. Besides being easy to wash, the metal covering amplifies the scratching sound so it can be heard anywhere in the house.

—Mrs. F. E. Bonner, Winnipeg, Can.

▶▶►I PLANT seeds exactly where I want them, without stooping, by dropping them through a 4' cardboard mailing tube and scraping soil over them with my foot.—

Boyd McWhorter, Moorefield, W. Va.

Garden Hose

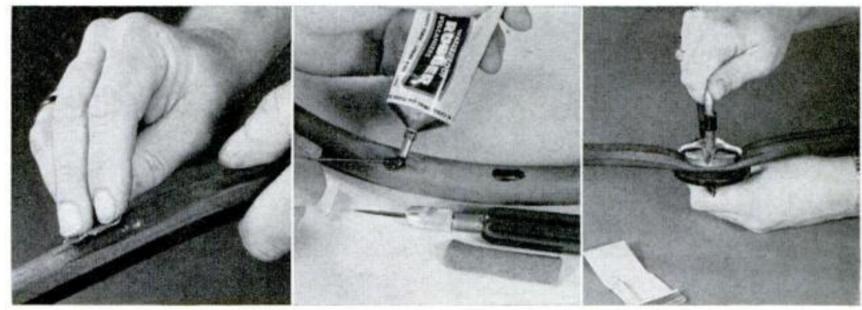
fix-it file

BEFORE BUYING A NEW HOSE, look the old one over carefully. A few leaks in a 50- or 75-foot length may not justify the cost of replacement. Repairs are usually easy to make, and there's a good chance that you can restore the old hose to reliable, leak-free service.

Even hardened kinks formed by tossing plastic hose in a heap instead of rolling it on a storage reel, as you see in the photo at the right, can be taken out. First soak the kinks in hot water, then knead the kinked area with your fingers until it's straight.

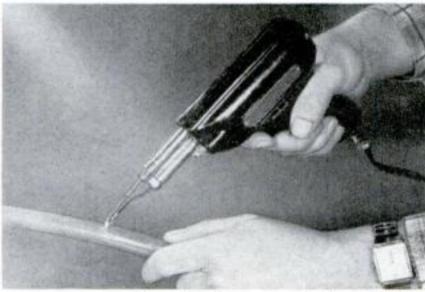


How to repair small leaks



RUBBER HOSE that leaks can be patched with plastic rubber or a tube patch. Connect the hose to the faucet and, with the nozzle shut off, search out leaks and circle them with chalk. After drying the hose, roughen the

area with sandpaper and work plastic rubber into small holes (center), vulcanize a "hot patch" tire-tube repair over a larger leak. Use the type of patch that's suitable for both natural and synthetic rubber.

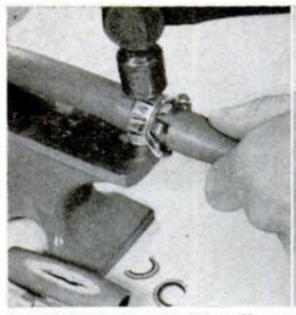


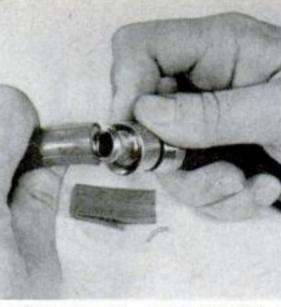
PLASTIC HOSE that develops tiny leaks can be made watertight with a clean soldering iron. Carefully and briefly touch the tip of the hot iron to the edge of the pinhole and push the soft, melted plastic into the hole.



A PLASTIC PATCH, cut from the end of a damaged hose, can usually be cemented over larger leaks. Round the corners and bevel the edges of the patch, coat patch and hose with plastic cement, apply patch and let dry.

Repairing hose by cutting out bad sections

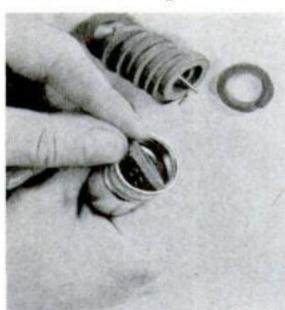


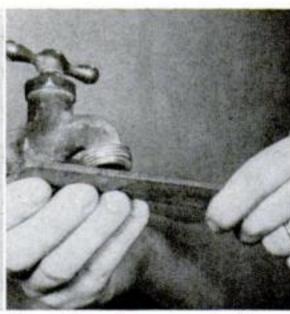




A COUPLE OF INCHES will never be missed from the ordinary hose. So if a split or leak is too large to patch, cut out the bad part and splice the good sections together. Cleats on hose mender (left) are hammered into rubber hose. Plastic hose is best spliced with a compression mender (center) that costs about 50 cents. New end couplings are equally inexpensive. Inner sleeve of plastic coupling (right) screws into hose to expand it against coupling. There's a cleat-fastened coupling that attaches to rubber hose.

How to stop leaks at hose connections



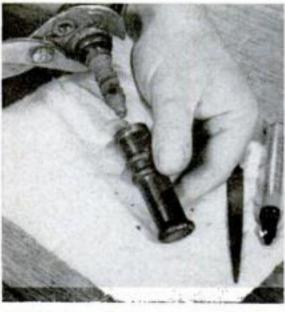




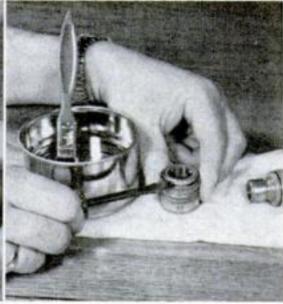
NEW WASHERS at the beginning of each gardening season will usually prevent leakage at the sill cock and at the nozzle coupling. If a leak persists at the sill cock, check the face of the opening to see if it is rough

or out of square. A few strokes with a long, flat file will true it (center). Damaged threads that prevent tightening the coupling can be reshaped with a thread file (photo at right) or a small triangular file.

Overhaul the nozzle, too

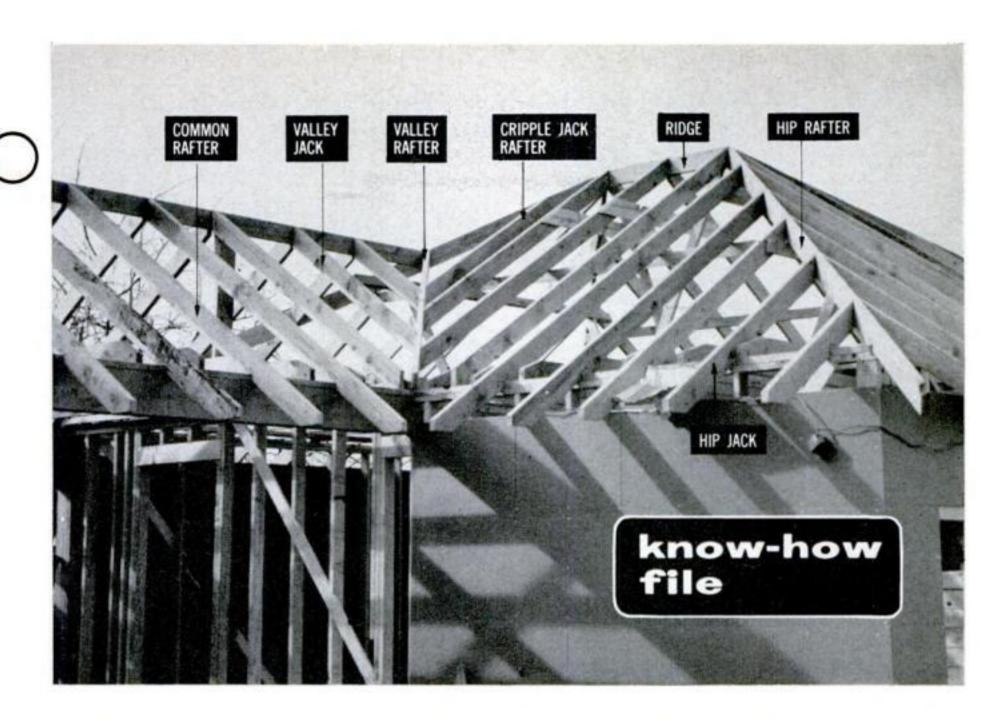






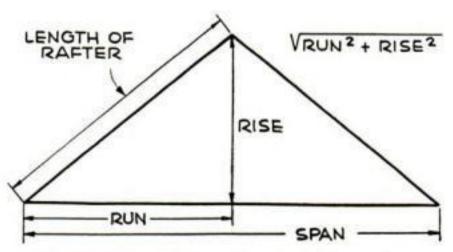
MOST NOZZLES COME APART when a sleeve is unscrewed at the rear. Replace packing to stop drips. Smooth corroded threads on spray adjustment, and unplug orifice with an ice pick. Lubricate with dry graphite. Some

newer nozzles (center) require only a new O ring to stop dripping. Quick-connect couplings (right) need only occasional cleaning to keep them working. Wash out grit with solvent and lubricate with graphite.



How to Cut Rafters

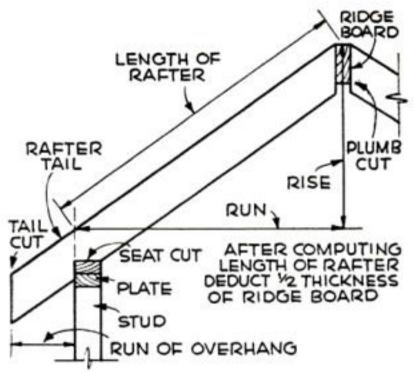
Sooner or later most home handymen are faced with the problem of laying out and building a roof. It may be for a playhouse or tool shed, or it could be for a summer cabin or house wing. Whatever the project, the cut-andtry method used by most amateurs is wasteful and inaccurate. Here are three ways to get perfect rafters every time.



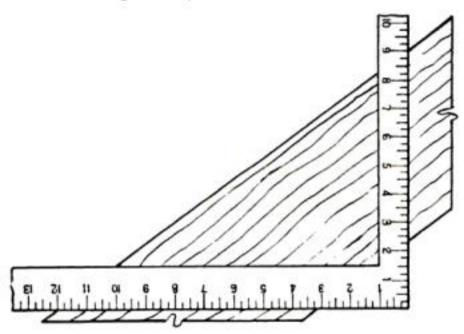
Right-triangle method. Although professional carpenters don't use it, this mathematical method for laying out rafters is often best for the weekend hammer-and-saw artist. Unless the roof is flat, think of any rafter as the hypotenuse of a right triangle. In building terms, the base of the triangle is called the *run* (half the *span*, when the roof slopes are symmetrical). The vertical side of the triangle is the *rise*. Finally, the *pitch* of the roof is generally expressed in the number of inches of rise per 12" of run. For example: A roof with a 9-in-12 pitch has 9" of rise to each 12" of run.

Now, going back to the right triangle, use the old textbook formula that the square of the hypotenuse is equal to the sum of the squares of the other two sides. If you know the pitch of your roof, you can easily work out the rafter proportions. In the case of a 9-in-12 pitch, rafter length per foot of run would be the square root of 225 (81 plus 144), or 15". If you're not sure of the exact pitch, use the physical measurements. Add the squares of the actual run and the actual rise. The square root of this sum is your actual rafter length.

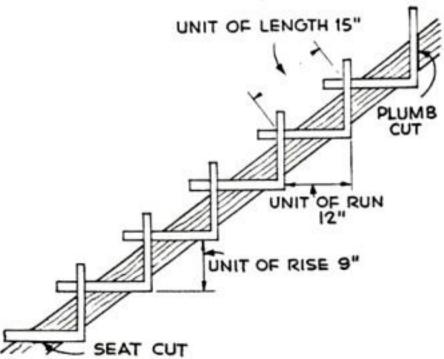
When cutting the rafter, the length must be reduced by one-half the thick-



ness of the ridge, since the run extends to the center of the span. You will also have to allow for the desired amount of rafter *tail*, or overhang beyond the wall plate. A steel framing square (below) is a valuable tool for laying out the upper and lower plumb, tail and seat cuts.



Stepping-off method. Here again you place the square in the position shown above and mark for the seat cut. Then (sketch below) advance the square, foot by foot of rafter run, up the stock until you reach your run and rise—minus half the thickness of the ridge board.



166 POPULAR SCIENCE JULY 1959

Table method. If you have a fair amount of rafter cutting to do, and more particularly when a roof involves compound angles, a special square with a

12	111	10	9	4
6 97	16 28	15 62	15	14
0.78	20 22	19 70	19 21	1.0
2 5/0	21 11/16	S 0 13/16	20	19
3 15/18	32 Wis	31 1/4	30	28
8 1/2	8 7/8	9 1/4	9 5/0	10
9 7/8	10 1/0	10 3/8	10 5/8	10
. 1	10	19. 1 .	Ω.	17

of rafter table on one blade. Arrows show how to determine common rafter length for a roof with a 9-in-12 pitch. The length, per foot of run, appears under the figure 9 (inches of rise). Other tables cover hip and valley rafters.

rafter table on one of its blades will give you handy information for determining the lengths of the six basic kinds found in roof construction. To use it, you look under the inch marking corresponding to the desired roof rise per foot of run, and select the figure aligned with the raftertype designation at the end of the table.

Here are the six rafter types (see illustration on previous page):

 Common rafter. Extends at right angles between the ridge and the plate.
 Its unit run is 12".

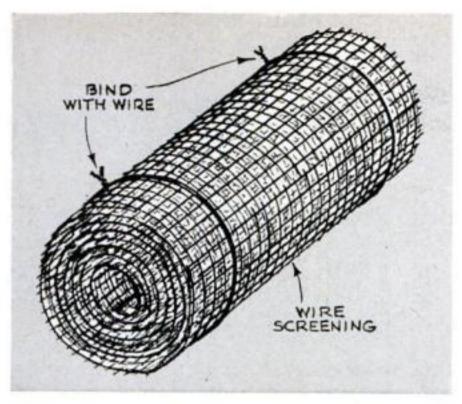
Hip rafter. Extends diagonally (usually 45 degrees) between the ridge and a corner of the plate.

 Valley rafter. Extends diagonally between the ridge and the plate along a trough formed by the intersection of two roof slopes.

 Valley jack rafter. Extends between the ridge and a valley rafter at a 90-degree angle to the former. It must have its lower plumb cut at a 45-degree bevel where it joins the valley rafter.

• Hip jack rafter. Extends between the plate and a hip rafter at an angle of 90 degrees to the plate. The upper plumb cut must have a 45-degree bevel where it joins the hip rafter.

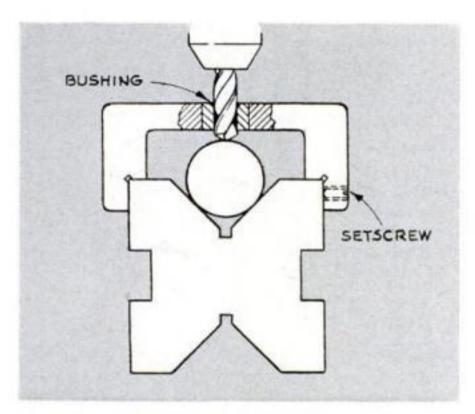
 Cripple jack rafter. Extends between a hip rafter and a valley rafter at an angle of 90 degrees to the ridge board.
 It must have both its upper and lower plumb cuts beveled where it joins the other rafters.



Screen-Wire Scouring Pad

A HEAVY-DUTY scouring pad for removing paint from metal can be made from a piece of old wire screening. Cut the screening into a 3"-wide strip and roll it tightly into a tube about 1" in diameter. Bind the tube firmly with wire.—

Paul N. Elving, Canoga Park, Cal.



Center-Drilling Attachment

Time and effort can be saved in laying out and drilling shafts held in a V block if you make a bushed centering saddle to fit the block. Have it clear the largest shaft you will drill. For smaller shafts the bit won't reach, use spacers of equal thickness between block and shaft.

One way to bore the bushing hole in the exact center is to clamp the saddle to the block and mount on a lathe faceplate, using an indicator to center the block. Machinists' or hardware-supply houses carry bushings with drill holes of proper clearance concentric with the outside diameter.—F. Murray, Chicago.

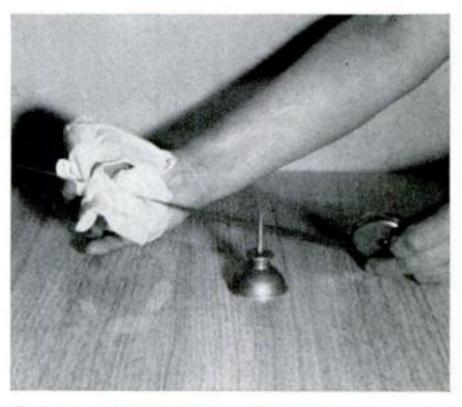




Nails Plug Oil-Can Holes

SMALL engines, especially the two-cycle kind that use oil mixed with gasoline, seldom need a whole quart of oil at one time. To protect what's left from dirt, I punch pouring holes with nails and use the same nails as protective stoppers.—

Hartwell J. Kennard, Gonzales, Tex.



Care of Your Steel Rule

APPLY a thin film of oil occasionally to your retractable steel rule. It will lubricate the inside mechanism, prevent rust and prolong the rule's effective life. —Donald Spichuk, Brooklyn.

►►► Soiled books can be made to look almost new again. Holding the book tightly closed, you scrub dirt off the edges of the pages by gently rubbing with dry, fine steel wool. Then wipe the covers with a cloth containing a small amount of petroleum jelly. This has both a cleaning and polishing action.—Gene Liberty, NYC.



You can bond almost anything to anything with—

Those

By Hubert Luckett

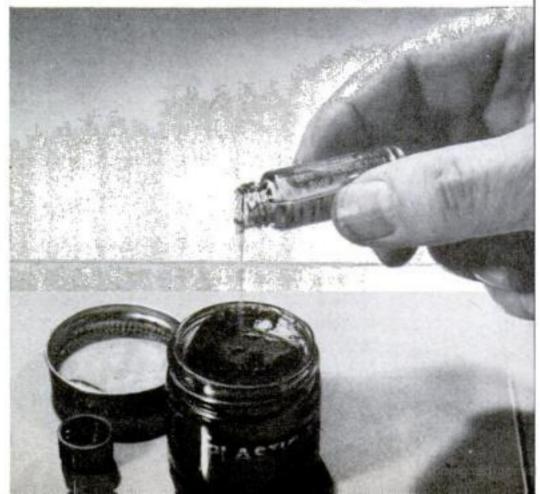
The home craftsman is going to find it easier to get his hands on some of those remarkable epoxy-based adhesives that industry has been using so spectacularly. And the adhesives are being made more practical for home use.

Already there's a trickle into the hardware stores of the stick-anything-to-anything glues and patching compounds. But it's only a trickle, and you may still have trouble getting them. One reason for the sticky situation: It may take your dealer a little time to discover that epoxies are not just another item in the deluge of gunks and stickums that vie for a place on his shelves.

A late development that promises wider distribution of epoxies is an announcement by Chrysler Corporation. Its Cycleweld Liquid Iron will soon be

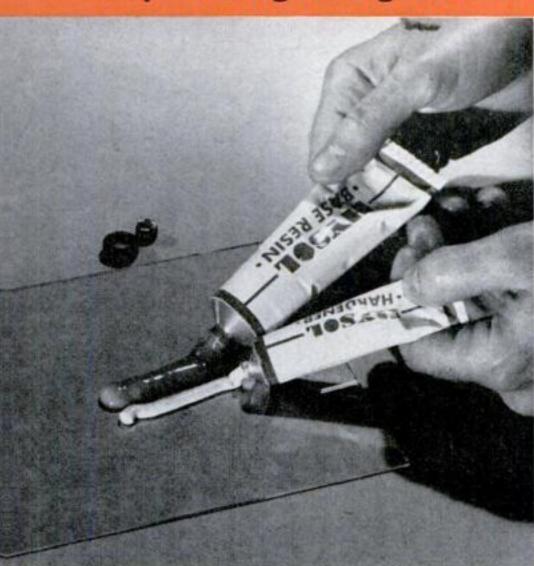
GLASS BONDED TO ALUMINUM and aluminum bonded to steel hook suspend model and chair at left. Area of each bond to glass is about 1½ sq. in. Armstrong adhesive A2 was used.

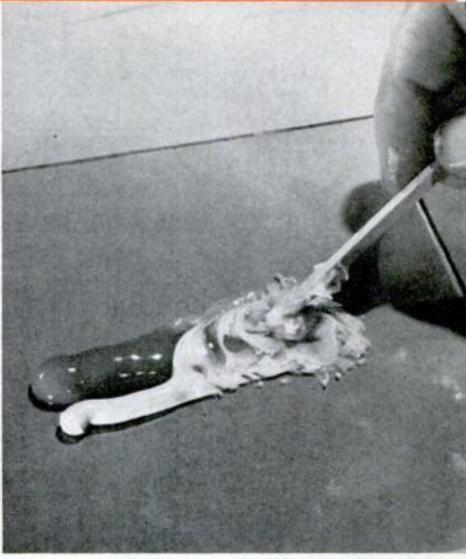
PLASTIC STEEL comes with exact amount of hardener for entire contents. For smaller amounts materials can be divided into quarters. Further division is difficult to make accurately.



Amazing Epoxy Adhesives

Proper mixing is a big factor in success with the new glues





HYSOL: Accurate proportions and thorough mixing of any quantity are aided by flexible tube containers. Equal lengths of resin and hardener

CHEMSTEEL: Iron particles for filler are supplied separately. Only resin and hardener are used in making a bond. Filler is added for cracks.

Excessive filler reduces bond strength.

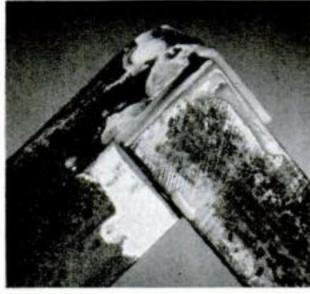
are extruded on a clean disposable surface. Mixing is continued until mixture is free from streaks. Metalset also uses this system.

ARMSTRONG ADHESIVE: Two hardening agents come with the Armstrong kit. Activator "A" is for room-temperature curing; "E" gives longer pot life but needs heat for proper hardening.





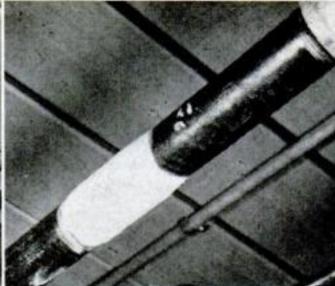
What can you do with epoxy adhesives? Here are just a



ANGLE IRON bonded with Hysol made joint that couldn't be broken with car jack. Note overlapping to increase bond area.



PERMANENT FIX for crack around bathtub. Surface of the cured resin is porcelainlike; can be scrubbed without harm.

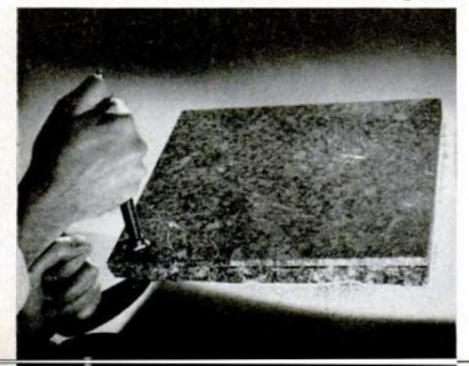


BANDAGE FOR LEAKY PIPE is the best way to assure a lasting repair. Fiberglass tape is best but any stout cloth will do.



METAL-TO-WOOD BONDING is especially useful. Here the man's weight is supported by a cross-bar of 3/16"-by-1" steel bonded to pine, which is bonded to a second piece of pine.

MARBLE REPAIR doesn't need babying. Broken corner glued back to this marble slab supported full weight of slab (1¹/₄"-by-15"-by-15"). In destructive tests, marble broke at another place.



sold in retail outlets throughout the country.

Some auto-specialty stores and mailorder houses have had a variety of epoxy products available for several years. First product with a wide distribution was Plastic Steel. Among other names on the market are Chemsteel, Permacel, Hysol, Metalset, Epocast, Tap Flex Bond, Helor and Armstrong.

An entirely new realm of possibilities for fastening, sealing and patching is opened by the epoxies. They can't be compared to ordinary glues and patching materials; you can forget most of your preconceived notions about what can or cannot be glued. You can make a tough, durable, waterproof, solventproof bond to steel, iron, aluminum, marble, porcelain, glass, wood, concrete—in fact almost any common material.

Epoxies are supplied as two components: the resin base and a hardening agent. They require mixing before use. Either of these components may be in liquid or paste form.

Warning: Proportions must be accurate and the mixing thorough to get maximum bond strength. Hit-or-miss procedures in this step will give disappointing results.

This need for accuracy has been a stumbling block to consumer use. For a one-shot application, the problem was easily solved by furnishing two preweighed containers. But for average home use, this is often wasteful; all the material must be used within about 20 minutes after it is mixed.

[Continued on page 220]

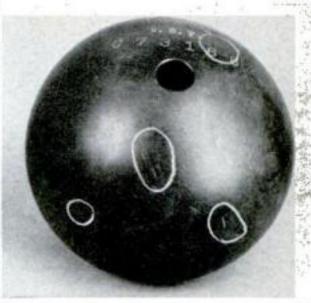
few of the many ways they have been found practical



PUTTY-LIKE PRODUCTS are excellent for masonry repairs where ordinary cement won't stand up. Cracks can be sealed watertight.



can be permanently repaired. Glue on outside patch if added structural strength is needed.

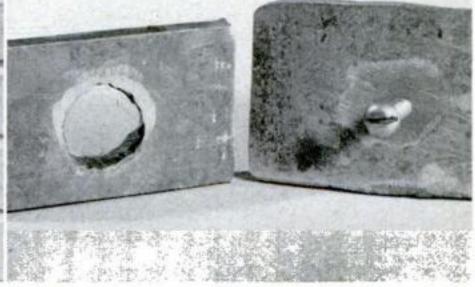


as new. Pits were cleaned and filled above surface, then sanded smooth after resin hardened.





FASTENING TO MASONRY WALL is a cinch. Cycleweld Liquid Iron was used to mount mailbox. Object can be held with tape until glue hardens, or simply by leaning something against it.



SCREW THREADS MADE TO ORDER: If you don't have the right-size tap, you can mold threads to fit any screw. Coat the threads with grease, then fill the hole with the screw in place.

Some of the companies that make epoxy adhesives

Armstrong, Armstrong Products Co., P. O. Box 1, Warsaw, Ind. Hysol, Houghton Laboratories, Inc., Olean, N. Y.

Metalset, Smooth-On Manufacturing Co., 572 Communipaw Ave., Jersey City, N. J.

Cycleweld Liquid Iron, Cycleweld Division, Chrysler Corp., Detroit 31

Epocast, Furane Plastics, 4516 Brazil St., Los Angeles 39

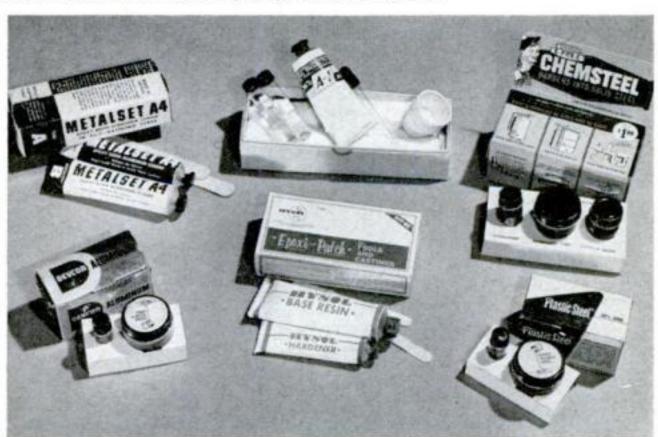
Plastic Steel, Chemical Development Corp., Danvers, Mass.

Permacel, Permacel Tape Corp., New Brunswick, N. J.

Chemsteel, Woodhill Chemical Co., 1390 E. 34th St., Cleveland 14, Ohio

Tap Flex Bond, Taylor & Art, Inc., Oakland, Cal.

Helor, Epoxy Coatings Co., P. O. Box 902, South San Francisco



products mentioned in article are pictured above. You'll find some in your local store; for others you'll have to write the manufacturer. (Cycleweld was not yet available as this article went to press.)

7 Hints for a Safer House

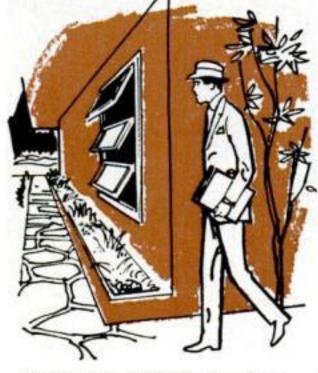
1 ESCAPE WINDOW measuring at least 24" by 30" in major rooms will give everyone a way of fleeing a fire.



GOOD design can provide safe and comfortable living for all occupants of a house, according to a study made by the University of Illinois Small Homes Council. Some of the good design points suggested in an eight-page circular, "Hazard-Free Houses for All," are shown here. The circular is available for 15 cents from the Small Homes Council, University of Illinois, Urbana, Ill.



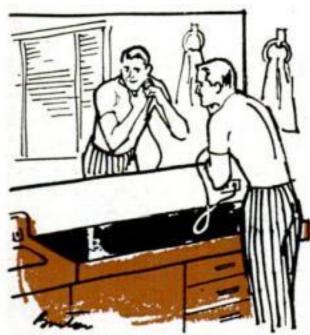
2 SHORT FLIGHTS of stairs with landings are preferable to one straight flight. Place sill of a stairway window at least 36" from floor so a person will not go through glass in event of an accidental fall downstairs.



3 won't be under windows that open outward. A good idea: Fill space with flowers.



4 CLOSET DOORS should have hardware for opening from inside. Put clothes hooks on doors above eye level.



5 IN BATHROOM, locate switches and outlets so none are in reach of the sink.



6 hazard of bumping into swinging doors, save space.



7 GROUND all electrical appliances. But don't use a gas pipe as a ground.



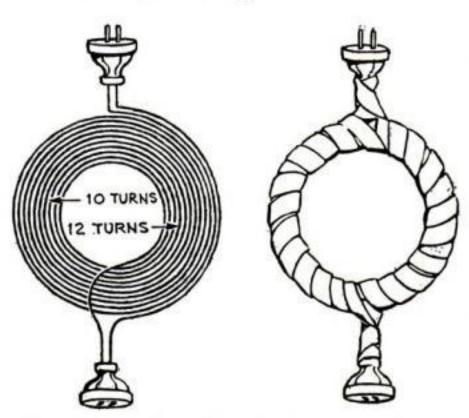
Short Cuts and Tips

Doubling Kitchen Shelf Space

Housewives can take a tip from the handyman's bottles and jars of small parts screwed to lids fastened to the underside of shelves. The idea works just as well for storing various dry foods in quart jars under the kitchen shelves and cupboards.—L. B. Leach, Cortland, N.Y.

►►► WHEN gluing up lapped joints, I find they will hold better if I insert a small amount of steel wool between the pieces. It acts as a filler between surfaces.—

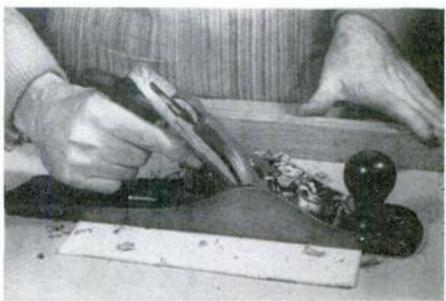
James Finnie, Pittsburgh.



Checking Appliance Current

I MADE my own energizer to simplify the reading of my snap-around volt-ammeter when testing low-current television, radio and appliance amperage. The 10 loops in the winding multiply the current passing through 10 times, making the reading much more accurate than measuring a single line. You simply divide the result by 10. Both sides read the same.— William Edmund Frazer, Kewanee, Ill.

▶▶▶A CURTAIN rod near the bottom of a closet door makes a good shoe rack. Hook heels on the rod.—Gene Feehan, NYC.



Plane-Iron Protector

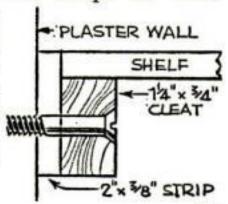
A SHEET of foam rubber or soft plastic foam will prevent nicks in a plane iron when you lay it on the bench during a pause in a planing job. It will also keep the tool from sliding or being pushed off the edge. The foam should be wider than the plane and two thirds as long.— Walter E. Burton, Akron, Ohio.

Fitting Shelves in Corners

If you place a ½" strip behind each cleat when installing shelves in a closet or other plastered corners, you can get the shelves in without undercutting to bypass irregularities. Use strips as wide

as the cleats plus the shelf thickness. Cut each to the length of the cleat it will back. It forms a rabbet to hold the shelf.—

B. F. Tinney, Charlottetown, Canada.





How to Build a Pedal Boat

By John Rogers

THIS streamlined pedal boat skims the water on a two-footpower engine—not as fast as horsepower, but a lot cheaper. Its payload: one youngster. Its size: less than five feet long and only 48 pounds overall. It even boasts power brakes (just back-pedal) and a full reverse shift (back pedal harder).

Ready-made water bikes come as high as \$100 to \$300, but you can build this one for the price of a piece of plywood and some standard bicycle parts. If a lake or ocean isn't handy, it's small and light enough to run in a swimming pool, stream or the nearest duck pond. The one-piece hydroplane-style hull looks sharp and is easy to build.

What you need. One 4'-by-10' sheet of 1/4" marine or exterior-grade fir plywood takes care of the top and bottom planking and the housing for the paddle wheel. This size is usually available on order; if not, use smaller plywood sheets, but make the bottom out of one length

for tightness and piece the top deck where joints won't matter.

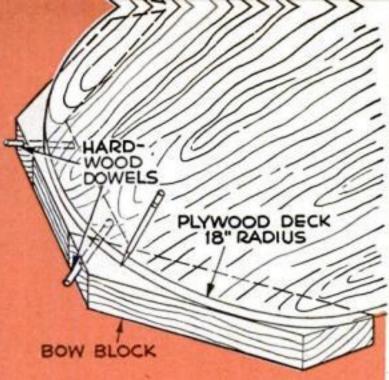
Frames and side members are $1\frac{3}{4}$ "-by- $\frac{3}{4}$ " white pine. The transom crosspiece is $1\frac{3}{4}$ " by $1\frac{3}{4}$ ". The bow block is made up of three $1\frac{3}{4}$ "-by- $3\frac{1}{2}$ " strips, cut and glued as shown.

All dimensions are actual. To save sawing, you can substitute stock one-bytwos and two-by-fours for the frame, but I prefer to rip my own because they come out cleaner and more accurate.

Shaping the bow. Cut the bow curve in the top deck first, using an 18" radius to provide a 36"-wide semicircle. Now, using the deck as a template, trace the bow curve onto the glued-up bow block.

The frame is assembled with waterproof glue and 1½" No. 8 flathead plated screws. Plated screws are rust resistant and are much cheaper than brass screws.

When the frame is complete, place it top side up and apply marine mastic seam compound to the bow block, sides, transom and the interior frames around the paddle-wheel well. This will insure a





SMARTLY CURVED BOW BLOCK is made up of three pieces of 13/4"-by-31/2" pine, glued and pinned together with hardwood dowels. To

shape the block, first cut the 18"-radius curve in the plywood deck, then trace this curve onto the block, as shown in the sketch at left.

waterproof joint between the frame and the plywood planking.

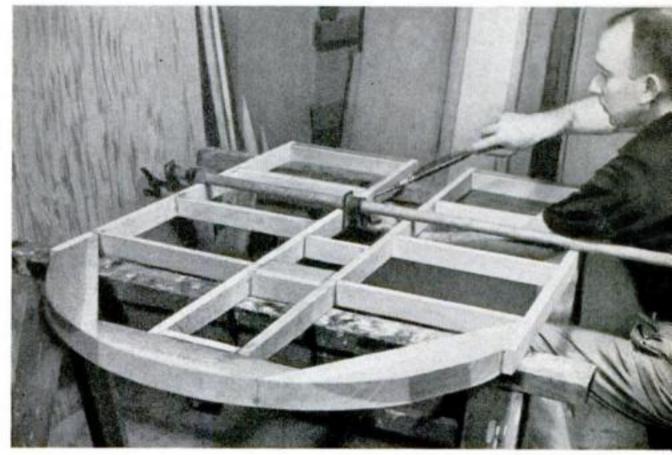
Attach the top deck first, then turn the frame over and plane off the bottom of the bow block so that it tapers forward to a thickness of 3/4" at the extreme front center. This gives the bow a smart upward flare and keeps it from dragging in the water.

The plywood bottom is then attached in the same manner as the deck. Allow a little extra length in the bottom for the curve in the bow.

Rigging the drive. After much pro and conning, I decided on a chain drive instead of a direct drive. This lets you step down the drive ratio, making it easier for youngsters to pedal. It also permits a smaller paddle wheel and a lower seating position because you don't have to raise the wheel high enough to hitch the pedals directly to its axle.

I experimented with several sizes of sprockets to find the best ratio, then settled on a 12-tooth sprocket for the pedal shaft and an 18-tooth sprocket for the paddle-wheel shaft. This combination gives you a step-down of 1: 1½

You can use bicycle chain



ALL FRAMEWORK except the bow block and stern pieces is 34"-by-134" pine (or stock one-by-twos). Use waterproof glue at the joints and 1½" No. 8 flathead plated screws. If a jig- or bandsaw isn't handy, you can rough-cut the bow curve with a straight saw, then follow by planing and sanding it to exact shape.

PLYWOOD DECKING is fastened to the frame with 1" No. 6 flathead plated screws, spaced 2" apart along the edges and every 6" on internal frames. For a professional touch, align all screw slots fore and aft. Plane off bottom of bow block to an upwardflaring taper before attaching the plywood bottom.



How to install a simple chain drive to give your water bike a

and sprockets, but as these come only in special sizes, it's usually easier to buy standard machine sprockets and chain. These can be obtained from local suppliers or ordered through hardware stores from companies like the Boston Gear Works.

Ask for sprockets to fit a ½" shaft. Roller chain, which must match the pitch of the sprockets you buy, is sold by the foot. Five feet will give you a few extra links to play with in adjusting the length. Also buy one master connecting link to join the ends of the chain.

Mounting the paddle wheel. Line up the paddle wheel carefully in the exact center of the well and mark the positions for ½" pillow blocks, which provide bearings for the wheel's axle. Actual installation of the wheel itself can be done later up through the bottom of the well.

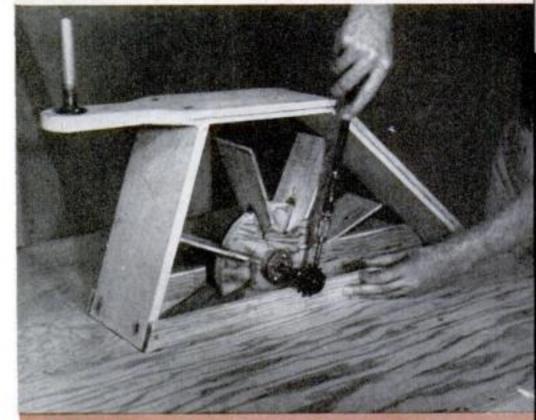
Mount the 18-tooth sprocket on the paddle wheel by means of its setscrew. The 12-tooth sprocket is then slipped on the pedal shaft and carefully lined up with the paddle-wheel sprocket.

Try the chain on the sprockets before permanently mounting the pedal support. It should run freely with a little slack but no slop. Add or remove links until length is approximately right, then make fine adjustments by moving the pedal shaft forward or back slightly.

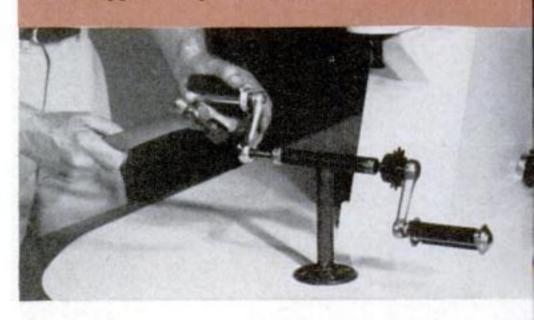
Steering. A pipe-flange mount is bolted to the seat board to serve as a bearing for the steering column. Handlebars can be taken from an old bike or you can make up your own from pipe or electrical conduit as I did.

A short crank arm is bolted or welded to the lower end of the steering column at right angles to the handlebars. A con-

Handlebars are hooked to a rudder to steer the boat



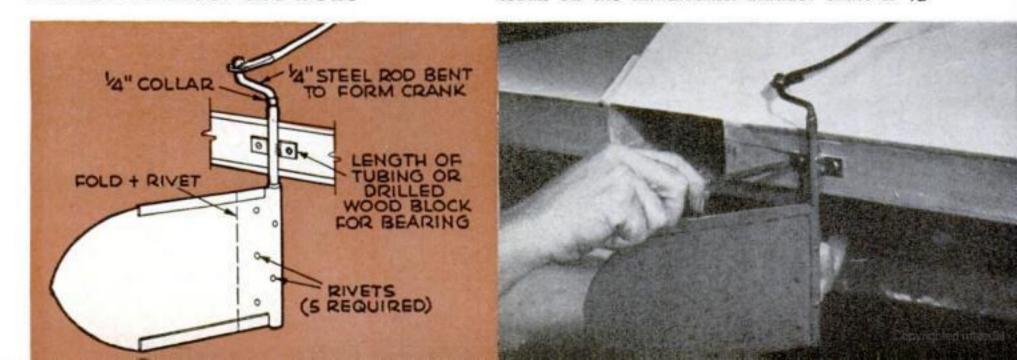
PADDLE WHEEL, hidden neatly under seat, is made of ¼"-plywood blades glued into slots in a wood disk. Its ½" axle rides in two ½" pillow blocks, available at most hardware stores. Seat braces are 6"-wide boards held by two side rails that support the pillow blocks.



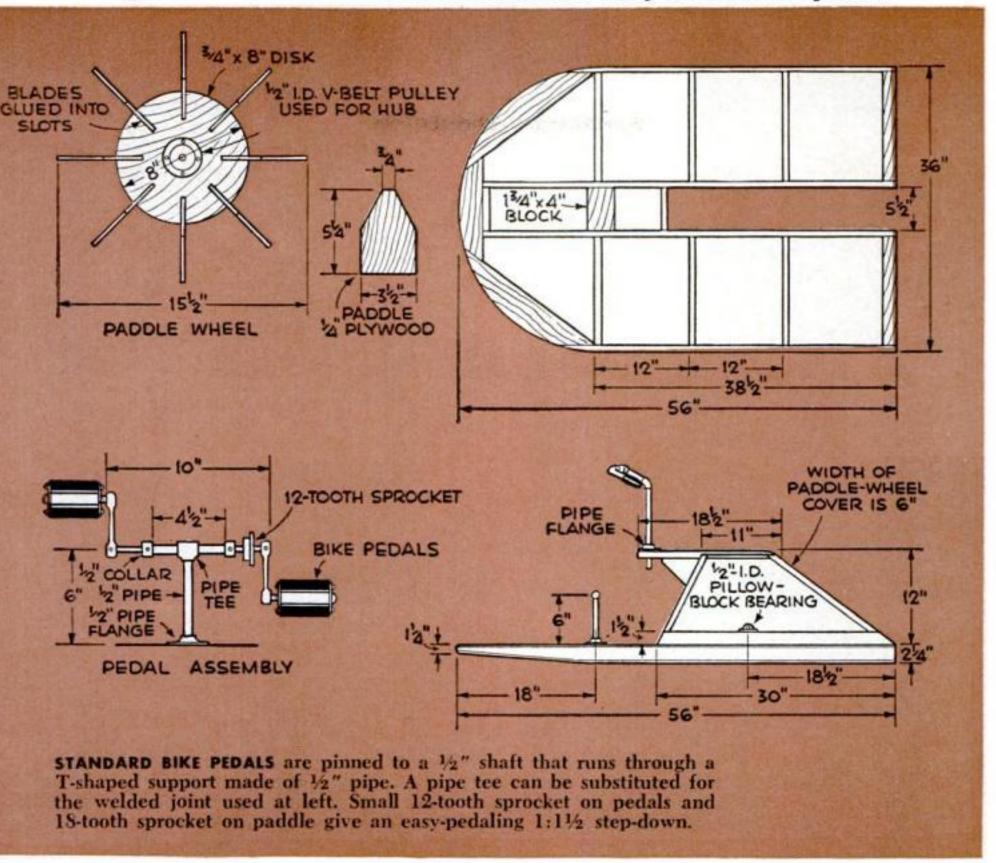
necting rod of tubing or solid steel rod then runs from the crank on the steering column to a similar crank on the rudder assembly. The rod is drilled at the ends and held with cotter pins.

Note that the rudder is mounted offcenter to the right. This is necessary to

RUDDER IS MOUNTED OFF-CENTER so that its control rod runs in a straight line to the steering crank on the handlebars. Rudder shaft is ½"



real "geared-down" transmission that's easy for kids to pedal



permit its crank arm, which points 90 degrees to the left, to line up with the steering arm, which points 90 degrees to the right. Reversing the cranks co-ordinates the handlebars with the rudder, which turn in opposite directions.

The finished craft easily supports my

steel rod bent to form a crank arm at top. Control rod can be tubing or solid rod flattened at ends and drilled to fit over the crank. Homenine-year-old. For heavier riders, you can increase hull thickness to $3\frac{1}{2}$ " and add a foot to the width, which can still be done using standard 4'-wide plywood.

I finished the bottom and sides in clear varnish and painted the top a dazzling white enamel with red trim.

made handlebars of pipe or conduit, as shown below, may actually be easier to rig than bike handlebars that come in odd sizes.



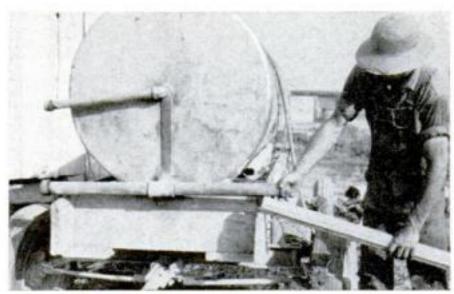
Short Cuts and Tips



Sawhorse Toolbox

On small construction jobs where tools are needed for a few days' work, an enclosed sawhorse makes a good carrier.

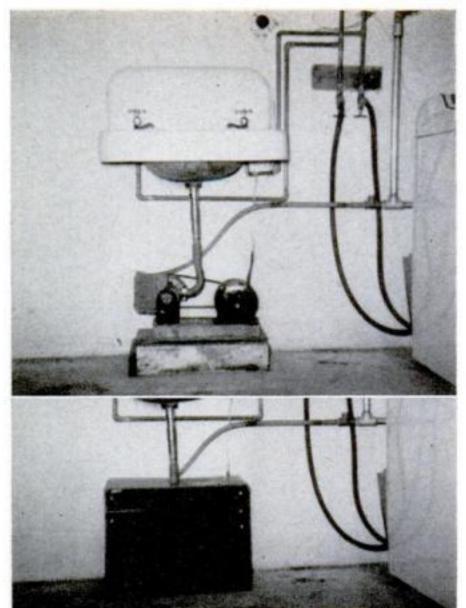
You simply box the legs, hinging a lid on one side so it can be opened up into a workbench. Legs are hinged two-by-fours just long enough to hold the bench top level. A floor and built-in shelves contain tools.—Harry Hess, Houston, Tex.



Carrying Water to Livestock

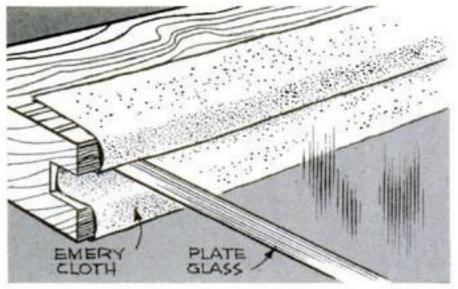
A PIPE T near the bottom of a water tank fills animal troughs on the farm of Gene Ferguson of Cedar, Iowa. It is fitted with short, capped pipes to allow filling on both sides of the wagon. Another pipe at the center of the water tank is used to supply high, 70-gallon hog waterers.—

A. M. Wettach, Mt. Pleasant, Iowa.



Sink in Low Basement

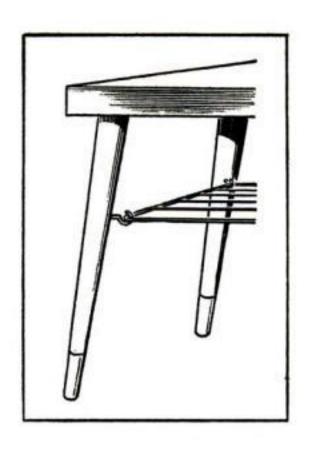
My sewer outlet is four feet above the basement floor, so in installing a sink I had to include a pump. I used a rubbervane pump from an old Bendix washing machine with a check valve in the drain line. It's run by a 1/6-hp. motor and a belt that steps speed down a half. Both switch and motor are grounded against shock.—Kenneth Burdon, Clinton, Conn.



Rounding Plate-Glass Edges

PLATE-GLASS shelves or table tops can be given a smooth, rounded edge if you use emery cloth in the groove of a piece of hardwood flooring. Plane down the edge of the flooring so the abrasive will not sink too deep into the groove. Rubbing briskly does a professional job.—

Douglas E. Williams, Greenwich, Conn.



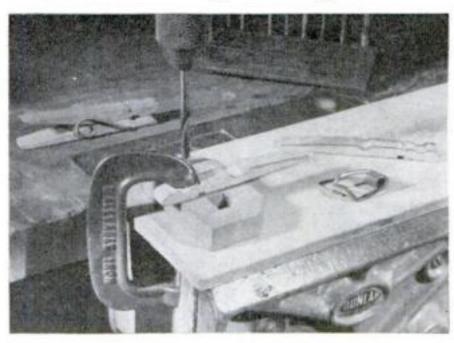


Refrigerator Shelves Hang Under Modernistic Table

WE MADE our coffee and end tables from flush-type doors purchased at a lumber mill. To keep magazines and books from cluttering the tops, we hung discarded refrigerator and oven shelves under them on cuphooks screwed into the legs and (on one long table) chain run up to the top. We painted the shelves and hooks a flat black for a modern look.—

Mrs. Irene Koffarnus, Chicago Heights, Ill.

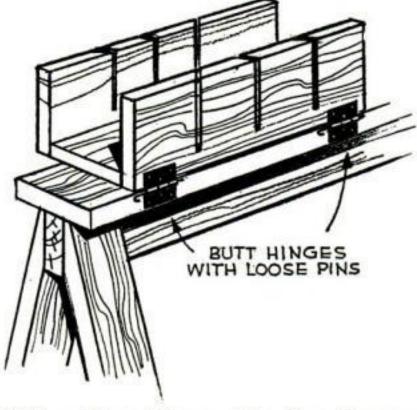
You can make a funnel for filling the gas tank of a model engine or the like from the plastic spout of a lighter-fluid can. Pry off the spout and press a piece of fine mesh inside if you need a strainer, too.—Fred M. Wollf, Sandusky, Ohio.



Clamp Pads from Clothespins

Handy pads for protecting wood surfaces from C clamps can be obtained in a jiffy by taking apart spring clothespins. The legs are of hardwood, and their long, narrow shape adapts them to almost any kind of clamping job.

Put the flat outer faces against the work. If not damaged by excessive pressure, the legs can be reassembled back into clothespins when no longer needed.



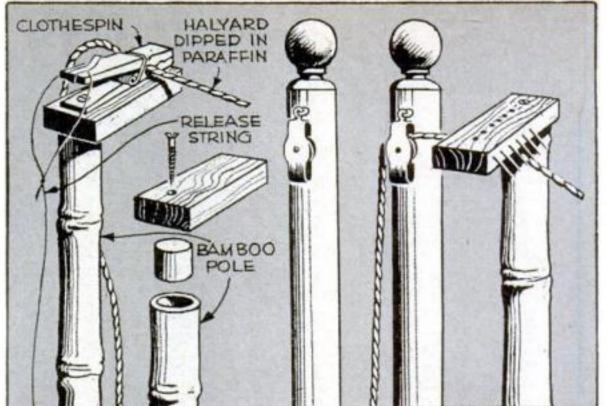
Miter Box Hinged to Sawhorse

Here's a way to hold a miter box on a sawhorse or bench without clamps or bolts. Two butt hinges do the trick. Replace the pins with long nails or hooked wire to be easily removed when the box isn't in use. Keep the lower leaves far enough down so the pivot won't block work.—William E. Duggan, Fairfield, Conn.

▶▶▶You can keep a ruler or straightedge from slipping when cutting glass if you coat the back with rubber cement. A single application will hold until rubbed off.—M. Robert Beasley, Jackson, Mich.

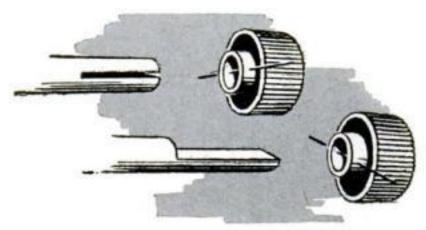
Short Cuts and Tips





Halyard Threader for Flagpole Pulley

I had to install a new halyard in a pulley at the top of a flagpole and couldn't reach it from a ladder, so I did it with the help of a spring clothespin fastened to a plug inserted in a bamboo pole. I soaked the end of the rope in paraffin and clamped the stiffened part in the pin. I pulled it through from the other side of the pulley with a "rake" made by driving finishing nails through a block.—Perry N. Deming, Bristol, Conn.



Tightening Loose Radio Knobs

A QUICK way to restore permanently a plastic radio knob that has loosened from use is to drill through it with a red-hot needle or pin. Put the pin through at the point where it will pass through the shaft slot or beside the flat; then clip it close.—Gerard P. Lietz, Chicago.

Squeeze-Bottle Cutting Oil

You can apply cutting oil to work in a constant drip or steady stream from a plastic squeeze bottle of the kind used for ketchup.

If the hole is too large, close it with a hot soldering iron and make a smaller one with a pin.—Howard J. Haarmann, Floral Park, N.Y.

▶▶▶ Wax sealing rings used in bathroomplumbing installations are easy to handle and effective in greasing the channels of double-hung windows so they slide up and down readily. I rub one occasionally also on the channels of my station-wagon windows.—₩. M. Watterson, Tampa, Fla.

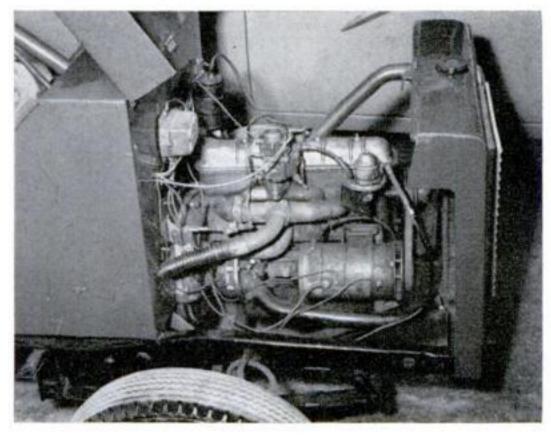


Kidproofing a Bathroom Lock

IF YOU have small children, you can keep them from locking themselves in a room by filling the lower slot in the strike plate with putty. When it is no longer needed, the putty can be chipped out easily.—James Finnie, Pittsburgh.



Horizon Lack of a better name, this boy-built vehicle could be called a Cut-Down Crosley. Jim and Jerry Eagan of Peekskill, N. Y., bought a 1950 Crosley station wagon for \$50 and chopped it in two. Wheelbase was cut to 3'9", chassis to 5'9". Steering column and stick shift were centered, airplane-style, flanked by clutch and brake. The body is home-bent sheet metal. The boys plan to add a second transmission to gear it down for hauling plows, mowers and carts. The grille—Detroit take note—is a metal rack that once served as a refrigerator shelf.









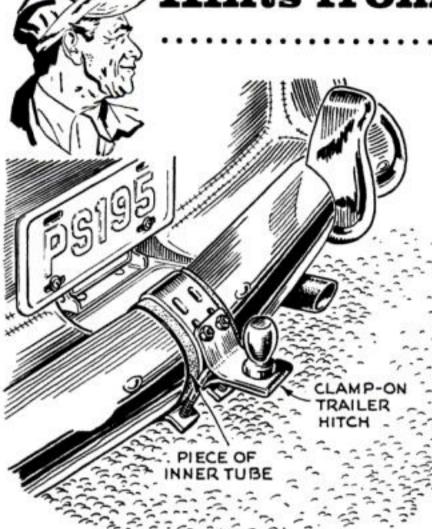
The Ford Galaxie Sunliner is one of today's top performing cars. Like 35 other great makes, Ford uses Champions.

- Q. Why do over *twice* as many car makers specify Champions?
- A. These experts know that Champion is the *performance* spark plug. To get top performance and economy in your car, put in new Champions every 10,000 miles.

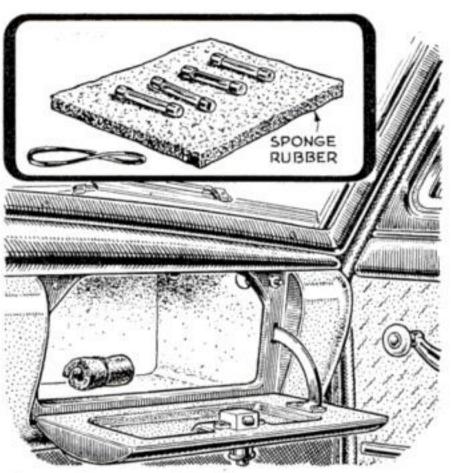
World's favorite spark plug—engineered for every car built by Ford, General Motors, Chrysler, American Motors, Studebaker-Packard and every major foreign maker.



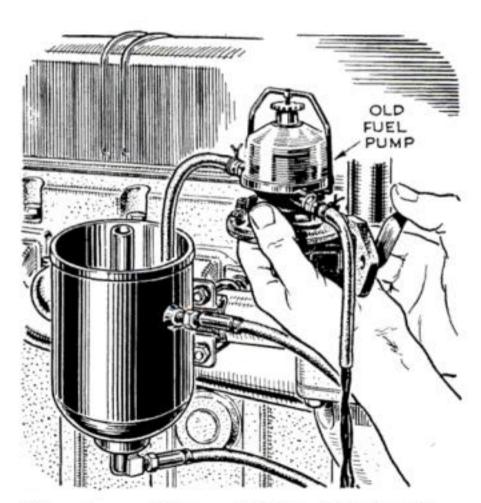
Hints from the Model Garage



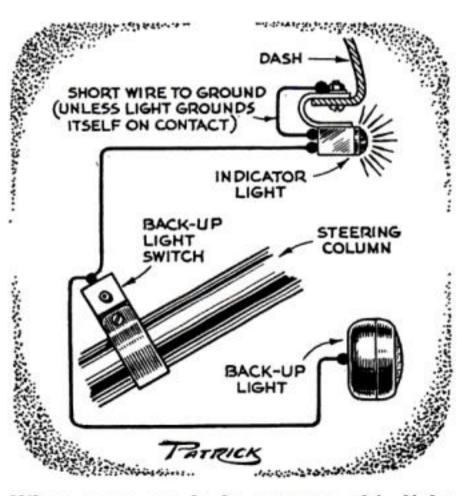
Cushion a trailer hitch with strips of rubber cut from a discarded inner tube. Placed between bumper and hitch, the rubber prevents chrome from being scratched. It also absorbs road vibrations which tend to loosen the hitch bolts.



Spare fuses and bulbs won't get smashed by tools, flashlights and such in your glove compartment if they're protected by foam rubber. Roll them up in a small sheet of the resilient material and wrap this with a heavy rubber band or two.

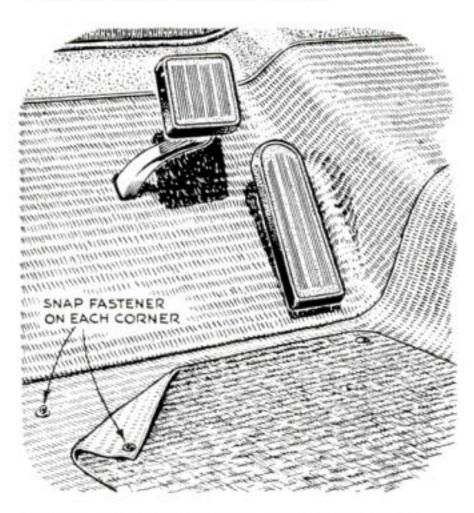


Cleaning out the oil-filter housing during an oil change is messy when the housing has no drain plug. For this difficult job I use an old, but workable, fuel pump. Moving the actuating lever by hand sucks out the sludge in the bottom.

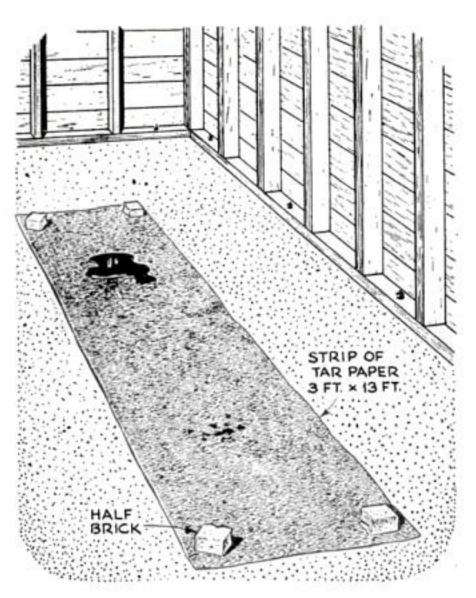


When your car is in reverse, this light blinks on to warn you. It's bracketed to the underside of the dash and wired to the back-up light switch. When the backup lights go on, so does the dash light as a visual reminder to the driver.

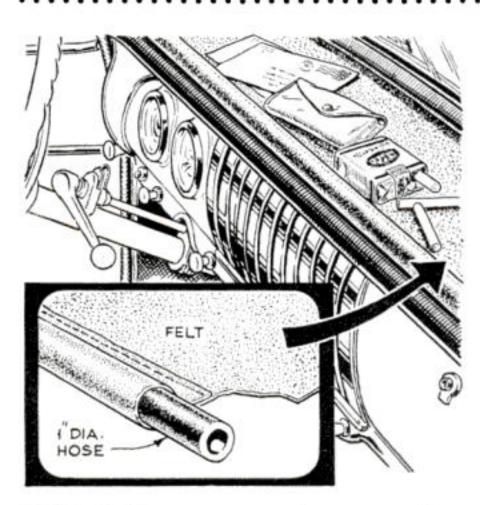
More Hints from the Model Garage



Anchor floor mats that shift around or curl up at the edges with snap fasteners. You can find suitable sew-on or hammerin fasteners at the sewing counter of any five-and-ten or notions store. Attach one at each corner of the floor mat.



Grease and oil drips won't dirty a garage floor if you put down a strip of asphalt building paper. The oil catcher is held down by half-bricks that can be moved easily when you want to replace the strip or clean the garage.



A felt dash cover prevents sunny reflections on a bright day and creates nonskid storage space for small articles. Sew the cover's rear edge around some hose; this forms a rim to keep the items on top of the dash from falling off.



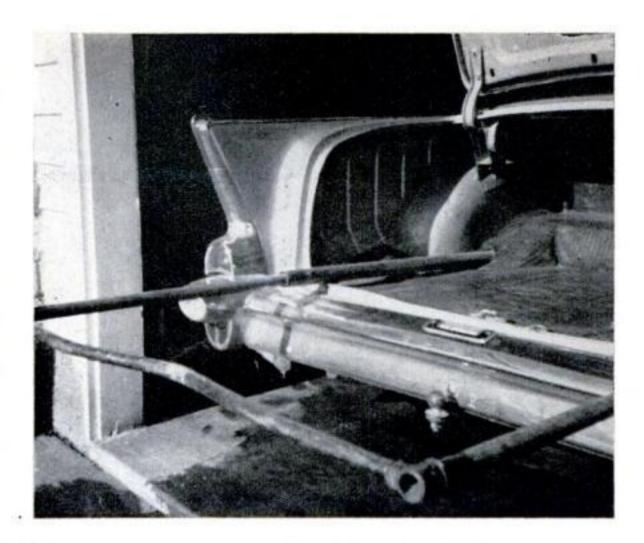
Faint bearing knocks can be detected by the mechanical reproducer from an oldstyle or child's phonograph. Fit a length of thin welding rod or coat-hanger wire into the needle holder and slip a makeshift rubber earpiece over the sound tube.

Outrigger in Trunk Supports Long Loads

LUMBER up to 10' long can be hauled in a car trunk with this telescoping support that extends several feet beyond the bumper.

Any size pipe can be used, as long as one pair slides easily into the other. The larger pipes were pushed into holes at the sides of the trunk, but not fastened. The smaller pipes were joined with tees to form a U-shaped support that slides in and out of the main pipes in the trunk.—

Carl H. Maass, Madison, Wis.



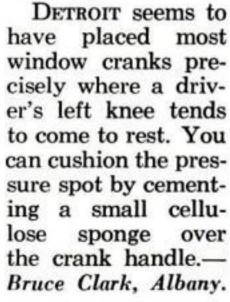
Hammer Props Flashlight



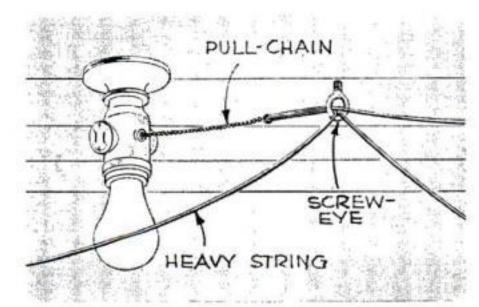
To TILT a flashlight upward when working in the dark with both hands, stand a hammer on its claw end and rest the flashlight on it.

A rubber band can be a help here. Use it to hold the light securely against the head of the hammer.—Glen F. Stillwell, Manhattan Beach, Cal.

Sponge Pad Protects Knee

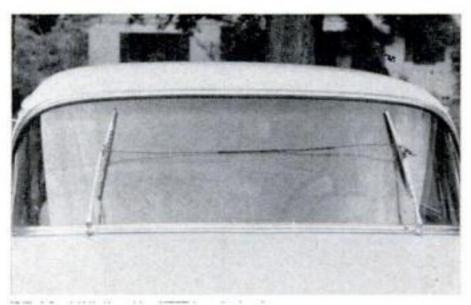






Strings Control Garage Light

By installing an auxiliary socket—
the type having a pull chain—in the
garage-light fixture, the light can be
turned on or off from any part of the
garage. Run strong cord from the pull
chain through screw-eyes to locations
convenient to the door or house entrance.
Leave the wall switch in the on position.
—Hugh Lineback, Stillwater, Okla.



Hanger Keeps Wipers Working

I DROVE a hundred miles in the rain recently, after the left drive cable on my car's windshield wipers broke, causing the driver's-side wiper to quit. I connected the wiper arms with a length of coat-hanger wire to make the operating wiper drive the dead one. Tape around the wire kept it from scratching the glass.—Charles Welch, Orlando, Fla.

Gus Meets a Medicine Man

By Martin Bunn

with a checkered bandanna as he came out of the Model Garage in response to an insistent horn honking.

"Take it easy, Hank," he said to a man behind the wheel of a delivery truck. "Got to watch your blood pressure in this heat."

"That's just what I told Walt Morehead. He's fit to be tied. Has trouble starting his car after every stop. People are drinking down to the free line and demanding their money back."

Gus chuckled. "Yeah, I did hear Walt was back in this neck of the woods with a fresh supply of his patent medicine. Maybe if he poured some in his gas tank..."

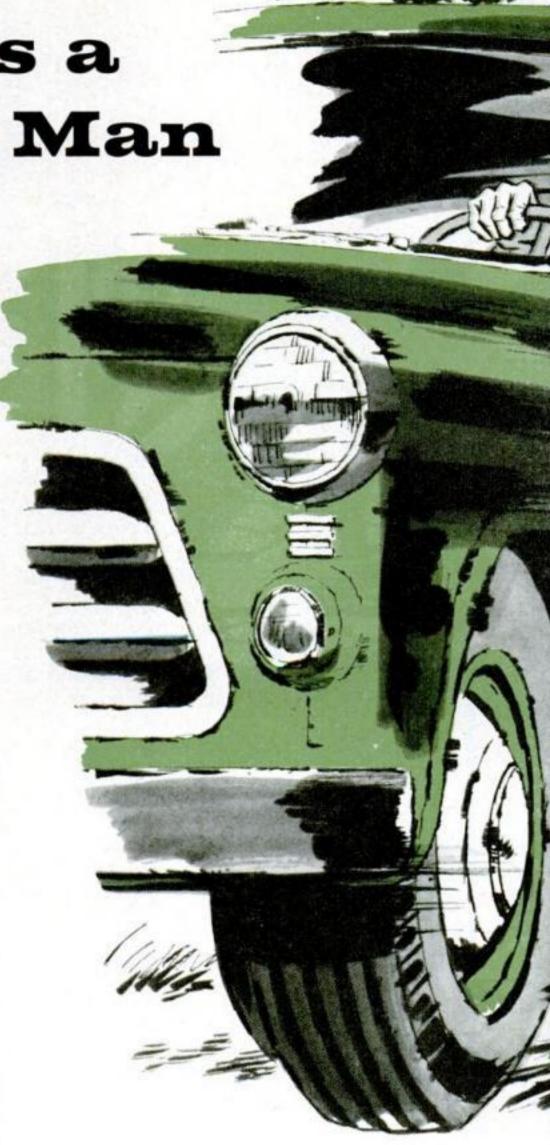
"He'd blow himself sky high," Hank said with a laugh. "But seriously, Gus, he's desperate and wants you to come to his rescue. Said he'd be somewhere around Pappy Spriggens' place."

As the delivery truck drove away, Gus turned to Stan Hicks, his young assistant. "I'll take my own car. Just throw a toolbox in the back."

"Sure," Stan said. "But what's all this about a free line?"

"An old come-on gimmick, Stan—and looks like it's backfired on old Walt."

Driving out of town, Gus's weathered face crinkled in a smile as he thought of Walt Morehead. Walt was the last of his breed, a peddler who toured the back country selling cooking spices and novelties, and patent medicines for man and beast. A short, bustling figure, hatless, his salt-and-pepper hair always in need of cutting, dressed in a sagging, out-of-date blue-serge suit, he was as much a part of the farm country as apple butter. The kids loved him and the adults,



though they wouldn't admit it, delighted in bickering with him for his wares.

Gus turned off into the Spriggens farmyard and pulled up behind Walt's 1954 panel truck, which sagged under its load of merchandise. Walt and Spriggens were having a hot argument.



"See!" Spriggens shouted, holding up a flat brown bottle to the sun, squinting at it through thick-lensed spectacles. "I ain't used it a hair below the free line. Give me back my two bucks."

"Hah!" Morehead retorted. He grabbed the bottle and held it at arm's length for the benefit of his near-sighted eyes. "It says right here on the label that the dosage is one tablespoon before meals and at bedtime. You haven't had the bottle more than 20 minutes and you've already taken four doses."

"Makes no difference," Spriggens ar-

CONTINUED

gued. "It also says that I can use the stuff down to the sample line of the bottle. And if I don't like it, I can return the rest and get my money back. It doesn't say anything about whether I take it in 12 hours or 12 minutes. I don't like the stuff. Cough up my two bucks, Walt."

Walt dug in a pants pocket, pulled out two crumpled dollar bills and turned to Gus. "That gol-derned engine is costing me money. If it had started right off, I'd have been gone before this old coot here could've put it over on me."

"Hey, boss, can these guys practice here during lunch hour?"

"I'd have nailed you next time."

"I'd have nailed you next time," Spriggens said, poking a finger at Morehead.

The peddler poked right back. "Oh, no, you wouldn't. By that time the medicine would've had time to work and straightened you out for fair."

"Maybe you're right," Spriggens said. "The way that poison of yours tastes, it would straighten out a crooked fence post." He guffawed, slapping his thigh. "Well, got to get on with my chores."

Gus had the hood of Morehead's car up. "What's the trouble, Walt?"

"Starting trouble, that's what. With old frauds like Spriggens here, a man has to get going fast once he pries money out of them. This makes three sales I've turned back in a week 'cause I couldn't get away quick enough."

"Just what happens?" Gus asked.

"Well, when I drive up to a place I shut off the engine. Can't afford to keep it running the time it takes to sell people on what's good for their arteries. Then, by the time I fiddle five or 10 minutes to get going, chances are my customer comes screaming out for his money back."

"Could be a number of things wrong to cause trouble like that," Gus said. "Let's take a look."

He checked the ignition system, cranking the engine by bridging the starter relay with the handles of a pair of pliers. Finding nothing wrong there, he went

on to the automatic choke and pulled the air cleaner from the carburetor. The choke seemed to be working properlybut he smelled gas. A close look into the carburetor throat showed signs of flooding. Suspecting a stuck float or dirt holding the float valve open, Gus removed the carburetor top, set it aside and took another close look. The float was riding normally and the float valve was tightly seated.

Puzzled, Gus put

the carburetor top back on. "Start the engine," he said.

Morehead lost no time getting behind the wheel and pressing the starter. The engine kicked over and ran smoothly.

"I'm on my way," shouted the peddler.
"Put that hood down, Gus. Got to get
going before some of those free-line guzzlers catch up with me."

Gus almost had to jump clear as Walt went by, one hand stuck out the window holding a bottle of patent medicine. "For your trouble," he said, stepping on the gas.

On HIS way back to the Model Garage, Gus looked at the bottle and smiled. It was probably the one Spriggens had returned, for it was already down to the free line. Walt wasn't taking any chances, but then he hadn't gotten any mechanical service in return for his

3 new CASITE products for 3-20NE engine protection

To keep your car's engine clean, friction-free . . . at peak operating efficiency!

Developed and Perfected

by Motor Engineering Specialists — The technical staffs of Casite and its parent organization, Hastings Manufacturing Company, specialize in just one thing—the maintenance of automotive engines. Working together, these experienced scientists and engineers have utilized the latest chemical discoveries to combat engine deterioration and wear.

for the FIRING ZONE

for the FRICTION ZONE

for AUTOMATIC TRANS-MISSIONS



Use these new Casite products with confidence. You'll have smoother, quieter power and performance, better economy and fewer repair bills.

IMPROVED CASITE ... FOR THE FIRING ZONE

The nation's favorite "Tune-up in a can" now vastly improved with spark plug and carburetor cleaner and acid inhibitor. Recommended for use in the gas tank or carburetor air intake to free valves and rings and clean carburetor and spark plugs. Also for use in crankcase oil for quicker starting, less start-up wear and to break-in new or rebuilt engines.

List price \$1.25.

CASITE 3-C . . . FOR THE FRICTION ZONE

A new heavy duty crankcase concentrate that stops noises in your car's engine. Added to your motor oil, Casite 3-C, with Barimen, stops hydraulic lifter noises, quiets and smooths the engine. You'll have a tougher oil that won't thin out—oil that cushions the load on every working part—cuts friction and wear. Cleans the engine, and keeps it clean. Protects against acid, rust and corrosion, too.

List price, \$1.50.

CASITE "SMOOTH-SEAL" . . .

For Automatic Transmissions—to reduce jerks and roughness and assure smooth, quiet operation. Stops and prevents leaks due to hardening or shrinking of the transmission seals. Reduces shock and wear, enables delicate parts to last longer.

List price \$1.95.

ALL 3 or double-your-money-back!

HASTINGS MANUFACTURING COMPANY • HASTINGS, MICHIGAN Casite Additives, Piston Rings, Oil Filters, Spark Plugs

medicine, either. Somehow Gus felt that the trouble had been staring him right in the face.

It was still bothering him a few hours later when the itinerant peddler drove up in front of the garage.

"You lost me another customer, Gus Wilson," he complained as he clambered out of the cluttered front seat. "And I just managed to get away from Mrs. Mahoney's as she came screaming out after me."

"Serves you right for running off on

me like that, Walt. Auto mechanics don't work like that medicine of yours. We have to diagnose the trouble before we can fix it. You didn't give me a chance."

The old man pulled out one of his bottles, took a swig, and calmed down. "Well, maybe. But you got the chance now. Guess nobody's going to chase me right into town for their money back."

"I've been thinking about your problem, Walt," Gus said, raising the hood. "If I were a betting man I'd lay odds that there's something wrong with the anti-percolator vent or valve."

"Anti what?"
"Percolator."

"You mean there's a coffee pot in the engine?" asked Morehead.

"Let me explain," Gus continued, again tackling the carburetor, but this time without cranking the engine.

"When you stop an already overheated engine under a hot sun, high-test gas is apt to boil, causing vapor bubbles to rise. In old-model cars they would be trapped in the unvented float bowl of the carburetor. Vapor pressure would then force gas out of the main jet into the venturi throat—the only exit. This would tend to empty the carburetor and dribble raw gas into the manifold, resulting in flooding and hard starting. This is what happened in older cars."

"Now, wait a minute, Gus. This ain't no Model T I'm driving."

"No, Walt. Your carburetor has an anti-percolator valve to prevent this. It vents the vapors of boiling fuel."

"Then why doesn't it?"

"We'll see," Gus said, removing the carburetor top. When he saw the float at the bottom of a nearly empty bowl, he picked up the top and examined it.

"Here's your trouble," he said, pointing with a pencil. "The anti-percolator vent is clogged with gum and dirt, and

the valve is stiff. The gas boiled over into the intake manifold. Smell it? Won't take but a minute to fix that up."

With the vent clear and the valve free, Gus reinstalled the carburetor. Walt had wriggled back behind the wheel.

"You may have to spin it a while to work the gas out of your flooded manifold," Gus cautioned.

"Can't wait," said Walt, stepping on the gas as he looked in his rear-view mirror. "There comes old Mrs. Mahoney down the road and she's spotted me." He was off with a screech of rubber. And Gus found himself with another bottle of Morehead's wonder worker in payment.

Where'd it come from?

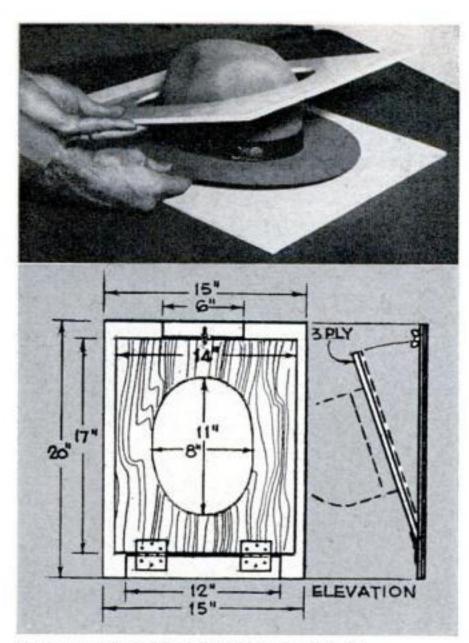
METER: As the basis for a new system of measurement, the meter was suggested to the Paris Academy in 1791. It was to be a length equal to one tenmillionth of a meridian quadrant (1/4 of a great circle through the poles). Today's definition is more sophisticated: 1 meter=1,553,164.13 wave lengths of red cadmium light (39.37 inches, that is).

MRS. MAHONEY drove up and leaned

out of a window. "Now why did Walt scoot off like that? I was of a mind to buy a box of liver pills and a bottle of sciatica medicine—nothing like it when a body gets pains in the joints. I'd better get going if I'm to catch him."

Gus took the top off the bottle in his hand and poured out some dark liquid. Then he handed the recapped bottle of Walt Morehead's medicine to Mrs. Mahoney. "When you do catch him," he said, "give him this and tell him I only drank down to the free line and want my two dollars back."

Next Month: Gus goes vacationing.



Press for Hard-Brim Hats

Two sheets of plywood make a press for preserving the hard brim of uniform Stetsons or drying them back to shape after a rain. Cut an oval in one to fit over the crown, butt-hinge them together and screw on a butterfly turnbutton to hold them.—Richard H. Boyer, Estes Park, Col.



New Uses for Alligator Clips

With the addition of a five-way binding post, you can make alligator clips take phone-cord tips and banana plugs as well as wires and spade lugs. Spread the clip sleeve to take the threaded shank of the post, then solder or not as you prefer.

—Art Trauffer, Council Bluffs, Iowa.

▶▶▶You can skim skin from paint left in a can with a wire-screen triangle tacked to a handle. Wash in brush solvent for re-use.—R. Miller, Lansing, Mich.

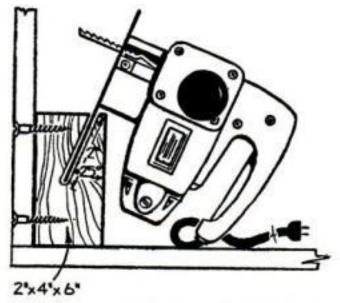
Short Cuts and Tips

FROM PS READERS



Fence for Step-Ladder Shelf

You can keep small parts, such as those from an electric-light fixture, from rolling off a step-ladder shelf if you apply wide adhesive tape vertically to the edge. It makes a simple and effective fence.—
Frank G. M. Corbin, Pelham, N. Y.



Making Stand for Saber Saw

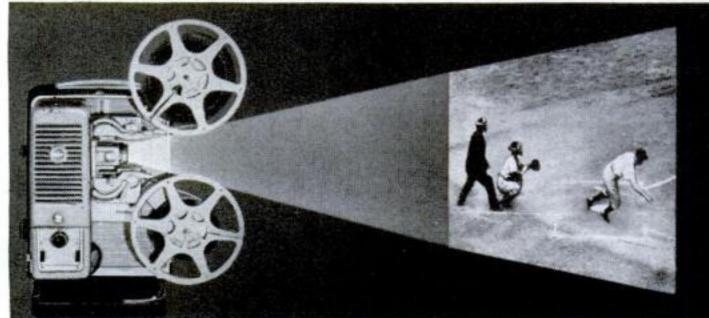
A SHORT length of two-by-four screwed to the cabinet wall makes a safe holder for your saber saw. Rip a 2" kerf at a 25- to 30-degree angle in the short side to take the sole plate and keep the saw in place. Wind the cord into a figure eight and slip a rubber band around it.

—N. D. Wray, Los Angeles.

Beautiful movies automatically



New automatic Kodak Cine Showtime Projector, Model A20, threads itself right onto the take-up reel—and starts show automatically! Has fast f/1.6 lens and new high-lumen lamp for brightest 8mm projection in Kodak history. 400-foot reel capacity. Only \$137.50. Model A30 has variable-speed control, operates on AC or DC. Comes with Kodak Presstape Movie Splicer. \$167.50.



See "The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet"

-from start to finish!



New Kodak Cine electric-eye-controlled cameras give you correctly exposed movies every time. New Kodak Cine projectors actually thread themselves . . . right onto the reel!

Now you're free to follow the action wherever it leads . . . without stopping to reset the camera lens! Imagine being able to film a subject moving from sunlight to shadow without taking your eye from the viewfinder—confident that every frame of color film will turn out beautifully exposed.

These new Kodak Cine cameras let you do just that. In bright light ... in shade ... indoors, their sensitive electric-eye meters constantly measure the light and automatically make the proper lens adjustments for you.

Perfect companions to the new Kodak Cine Automatic Cameras are the superb new automatic Kodak Cine Showtime Projectors. They thread themselves completely, then start the show...automatically! You see your movies brighter than ever before. This is movie equipment your photo dealer is proud to demonstrate! Visit him today.



New 8mm Kodak Cine Automatic Turret Camera, f/1.9, has electric eye that automatically adjusts lens to any light. Yet, you can lock the lens opening at any desired setting. Comes lens-equipped for regular, wide-angle, telephoto shots. True telescopic viewfinder, built-in "Type A" filter, low-light-level signal. \$124.50. (Single-lens model, \$92.50.)



New 8mm Brownie Automatic Movie Camera, f/2.3, with electric eye that automatically sets the lens for you—indoors or out. Adjusts for ASA film indexes 5 to 40. Has multi-frame finder, accepts auxiliary Kodak wide-angle and telephoto lens converters. Never before an automatic movie camera priced so low. Only \$74.50.

Most dealers offer terms as low as 10% down. Prices are list, include Federal Tax, are subject to change without notice.

EASTMAN KODAK COMPANY Rochester 4, N.Y.



[Continued from page 55]

the floor (you can see the gap if you look closely). A gentle tug on the cleaner's hose glides the heavy canister right across a rug.

All the air sleds use this air-bearing principle, but hoke it up to support loads incredibly heavier than vacuum cleaners.

The Ford version is the simplest. The vehicle has flat pads underneath, each with high-pressure air whistling out a hole in its center. This creates a thin film of pressurized air under the pads, enough to hold the vehicle up off the surface. But—to support reasonable loads with reasonable air supplies, the clearance between pads and surface must be very small, around .025 inch. That means the surface has to be very smooth—a rail. And this is the idea that Ford's engineering v-p, Andrew Kucher, is pushing: a jet-propelled train. It would ride on a thin film of air underneath pads that fit around a standard rail.

The Spacetronics machine gets off the rail by feeding the compressed air to one big hollow chamber—the vehicle is like an inverted cup. This gets a lot more lift—six inches or so, enough to ride over fields or water. But it takes a tremendous volume of air—somewhere around a million cubic feet per minute to support a 25-foot raft.

Weiland's idea is more involved. He plans a series of grooves underneath his sleds, with propellers inside each groove pumping air up to be bounced down again. This way most of the air is trapped underneath the sled, continuously being recirculated, and not much leaks out past the edge of the sled.

Weiland's "labyrinth" air traps should work best with a big sled (the air-escape area at the edge is then small compared to the volume of air trapped in the cushion), and his proposal is a big one: a 330-foot, 1,000-passenger ocean liner. It would cruise 35 feet high—well out of reach of waves—at 100 knots!

The Illinois physician, Dr. Bertelson, is working still another angle. His sled has a smooth bottom with slots for air jets at the edges. The air then comes out in a flaring stream, lily-shaped. When the air stream hits the ground, part is bent around and back up underneath, supporting the sled.

This edge-jet design is the one favored by government engineers. Reason: It promises to lift hundreds of pounds of load for every pound of thrust expended by the air jets. (For comparison, the Boeing 707 jetliner carries about five pounds for each pound of thrust.)

Credit for pioneering research on this kind of jet goes to Uwe von Glahn of the National Aeronautics and Space Administration. His static-test data are relied on by most sled builders. Von Glahn didn't invent the edge jet, however, and it's not at all clear who did. (The basic patent, if there were one, would be worth millions.)

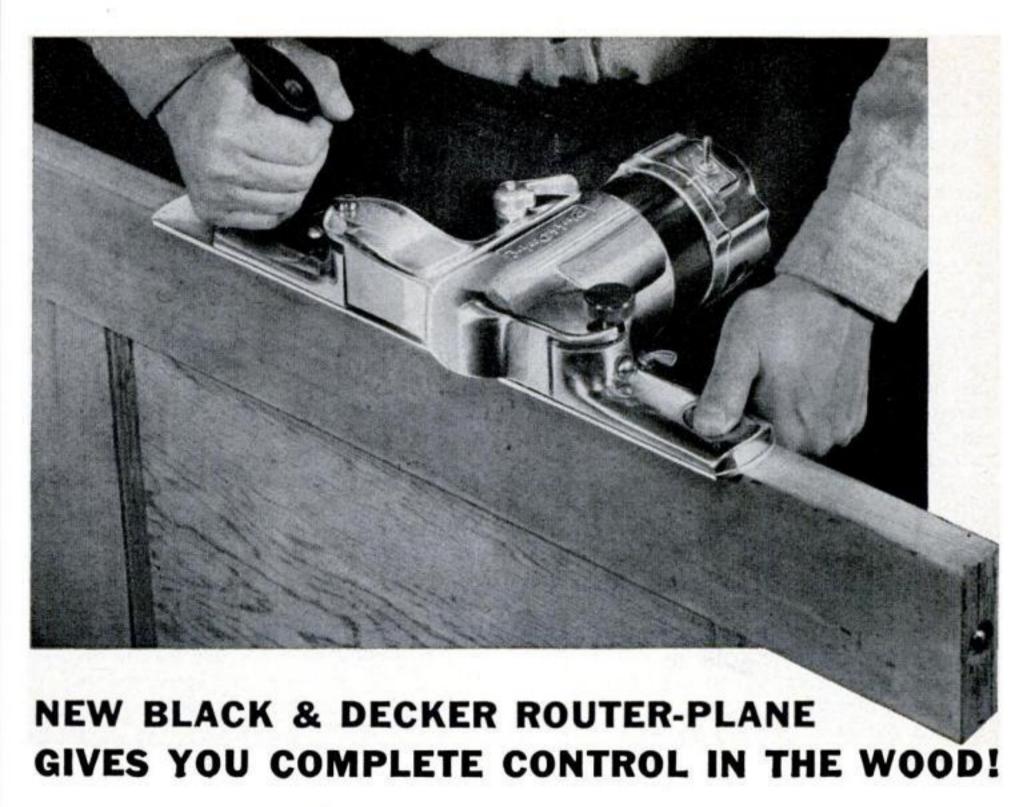
What's wrong with them? You can build a working model of an air sled yourself with a model-airplane engine and a child's snow coaster (see page 54). It will fly beautifully across your lawn.

So why hasn't the Navy ordered a fleet of big ones? Beyond the zillions of technical problems that stand between the working model and the usable machine, a couple of stoppers worry engineers:

- Forward speed of the sled may blow its supporting air cushion right out from under it, and the thing won't stay up. However, Dr. Gabriel Boehler, Catholic University's young professor of aeronautical engineering, who is analyzing airsled theory for the Navy, ran a model in a wind tunnel at 40 m.p.h. with no trouble, and thinks that, one way or another, the cushion can be maintained.
- Dust raised by the air jets may cause trouble over land, and spray over water.
- Hills, surprisingly enough, could stop the air sleds dead. The Spacetronics machine, for example, had trouble staying on a crowned road—it kept sliding off into the ditch. Dr. Bertelson's machine couldn't climb all the way up the beach after gliding across a pond. The reason: The air cushion holds the sled parallel to the ground. If the ground is not level, gravity makes it slide, just as gravity makes you slide down an icy hill.

The objections are mainly theoretical, so far, and may stay that way. This summer's trials will tell. As one inventor, miffed at missing a fat government contract, said:

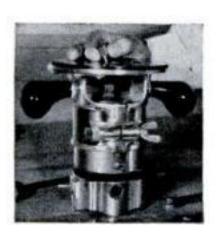
"We know we can build a machine that works even if those Ph.D. aerodynamicists can't figure out why it works!"



It's a 34 HP Router and a Power Plane combined!

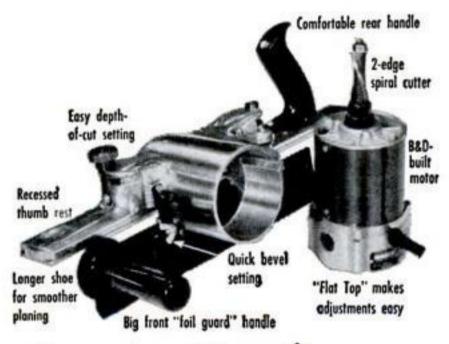
As a plane it gives you perfect balance, fast and accurate cutting, easy-to-use depth and bevel adjustments. Notice how that extra-length front shoe gives you greater accuracy in starting cuts. Notice how the motor is balanced midway between the hands for level operation. Notice how the longer front handle and thumb rest put you in control of the job at all times. Quickly adapted to ¾ HP Router. (See below).

The powerful B&D-built Router motor handles continuous-duty operations on the toughest routing and planing jobs. Complete Kit includes router motor, plane attachment and router base in sturdy metal carrying case. Ask your B&D dealer about it.



BLACK & DECKER % HP HEAVY-DUTY ROUTER

One of the lightest, most compact routers on the market! The simplest micrometer depth adjustment, specially-designed handles, exclusive "flat top" and other features make the B&D Router the builders' best buy!



Black & Deckers World's Largest Maker of Electric Tools

	~~
200	Look Under
	-100CFBIRCIER.
	In Lessen Leder
	4

THE BLACK	& DECKER	MFG. CO.
Dept. 5079,	Towson 4,	Md.

□ Please send complete descriptive literature on new B&D Router-Plane

Towson 4, Md.

☐ Enclosed find 50c for B&D Router Manual

Name.....

Address.....

City.....Zone...State.....

Getting the Most Out of Road Maps

[Continued from page 60]

on map accuracy, noting detours, graded roads that have recently been paved, and city streets converted to one-way traffic.

The more popular maps distributed by the major oil companies are revised and updated once a year or oftener. A typical annual revision will involve well over a thousand changes to correct errors, revise town populations, show new roads and interchanges, current and projected construction, modifications in preferred or favored routes, and changes in parks, airports, or roadside stops that may have been closed, opened—or simply discovered—since the last printing.

Using a map calls for know-how. If you're driving the turnpikes or a couple of main through routes, you don't want to be bothered with huge, hard-to-fold sheets. But for touring or local driving you'll be best off with the newest, largest-scale map you can find. Study the key—and scale—first when you open a new map. And study the map, too. On many you will find unkeyed variations of line, color and detail. If you don't see an explanation, let common sense be your guide. Mapmakers use lines and symbols to suggest things they can't spell out.

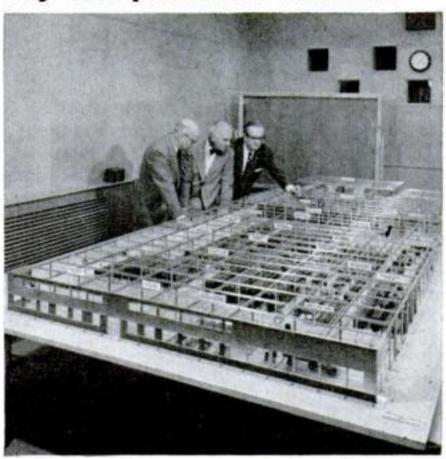
Almost without exception, their visual hints mean exactly what you would expect. Thickness variations as small as a couple of thousands of an inch aren't accidental. If a map line gets wider or narrower, you can be pretty sure the road does the same. When an unnumbered spur road suddenly blossoms out in a color reserved for main highways, a mapmaker is trying to tell you about a detour that could be worth trying if you get bogged down in traffic. An abrupt jog in an otherwise straight road may be a warning of a tricky or poorly marked intersection. When color is used along part of a projected route, a good guesser is trying to indicate a section that may be in business by the time you read the map. Differences in line prominence and shades of color usually reflect actual differences in drivability.

Like route markings, the pictures and tour information on road maps have been carefully weighed. You can bank not only on what is said but also on what is suggested. Differences in type size correspond very closely to actual differences in place sizes. If a vacation map tells you there's good fishing at a particular spot, it's a safe bet that you'll find boat rentals, equipment and facilities nearby. The picture of a skier means lodges—and possibly lifts—not just snow and slopes.

Plot your course before you start out. And if you don't have a co-pilot who can check your route while you drive, pull off the road to study the lines and squiggles. You can make driving safer and eliminate a lot of unnecessary sign reading by getting advance bearings on your next stop or turnoff. Try to pick out a landmark a little distance ahead. Much of the seemingly useless information that appears on road maps is ideal for keeping oriented: You can tell you'll hit Route 42 three miles after you pass a hospital on the left; when a nameless stream wiggles across the road, you can figure distance from the point where you cross a bridge. If you have to turn a mile beyond, this could be your signal to get into the proper lane or to forget about passing the truck up ahead.

You have to look closely to get the most out of a good map. But if you do, it pays in easier, pleasanter, safer driving.

Toy-size plant aids builders



While plans for its Milwaukee plant were still on the drawing board, Evinrude did its second thinking with this try-iton-for-size model. By showing up bugs, it avoided shifting of equipment.



How to make your diploma pay off in Military Service

Published especially for high school graduates and seniors

Just off the presses! A valuable 48-page booklet titled The Secret of Getting Ahead. This free booklet explains all about the special Army opportunities open to high school graduates—shows you how to make your diploma pay off in military service!

Learn how you can choose technical schooling before enlistment

The Secret of Getting Ahead includes the complete Graduate Specialist story—all the facts about the Army educational program for high school graduates and seniors only. If you meet Graduate Specialist qualifications, you'll be able to choose technical schooling before enlistment. This booklet describes each of 107 Graduate Specialist courses—gives you details about up-to-the-minute training in Electronics, Atomic Weapons, Radar & Television Repair, Machine Accounting, Guided Missiles, Drafting and many more.

Do you know the answers to these important questions?

What are the qualifications for the Graduate Specialist Program? How can a high school senior gain by applying before and enlisting after graduation? Does Army schooling have civilian value? What are Army schools like? What is the "secret" that increases your chances for success when you make any decision? The Secret of Getting Ahead answers all these questions—and many others. What's more, the booklet contains vital informa-

tion about Selective Service and Army Reserve-important facts every draft-eligible young man should know.

Here's the fastest way to get your free copy

To get your free copy of The Secret of Getting Ahead in the quickest possible way—stop by your local Army recruiting station. There's no obligation. No recruiting station in your area? Then use the coupon to order your free copy direct from Washington. It'll be mailed to you immediately—without obligation.

PS-7-59	
THE ADJUTANT GENERAL Dept. of the Army Washington 25, D. C. ATTN: AGSN	
Please rush me a free copy of The Secret of Getting Ahead. (I'm a high school graduate or senior.)	
Name	
Address	
CityZone	State

"Space Fence" for Spy Satellites

[Continued from page 65]

able numbers of quanta every instant.)
The Navy's antenna arrays—acres of complex wire—are located hundreds of miles apart, but the separation between the arrays is exact to within a foot or less.

Both systems work like radar. A transmitter sends out a carefully shaped beam, like a thin vertical fan. Any object that passes through the fan reflects some waves back to receivers flanking the transmitter. Measurements of the reflected waves (this is where the Army and Navy differ) reveal the path of the object.

The U. S. space fence is made up of three "complexes," each one consisting of a transmitter between two receivers. The Navy operates the ones at the ends of the fence; the Army covers the middle.

Doploc vs. Minitrack. The Army uses the Doploc system, originally designed by the Ballistics Research Laboratory at Aberdeen Proving Ground for tracking our own satellites. Disregarding its refinements, it is actually a version of the radar meters that the cops use on speeders.

The waves reflected by a satellite change in length because of the satellite's motion. If the satellite is moving toward the receiver, the waves are squeezed together (shorter wave length); when the satellite moves away, the waves are stretched out (longer wave length).

Ciocking a satellite is simply a matter of measuring this "Doppler shift" in wave lengths. It's simple, that is, with Doploc's marvelously delicate black boxes, which unerringly pick a wisp of a reflected signal out of a hayfield of static, and then lock on to it so that it can be measured while it changes. Doploc can work with a reflected signal 4,000 times weaker than the static it is lost in (signal-to-noise ratio of 36db above). It's not really a fair comparison, but a good TV set needs a signal 100 times stronger than static (signal-to-noise ratio 20db down) to make a usable picture.

The Navy's system is different. It is adapted from Minitrack, which was developed by the Naval Research Laboratory for the same purpose as Doploc, to follow our own satellites. An electronic counterpart of the optical interferometers used for ultraprecise gauging of machine parts, it counts the difference in the number of wave crests received by antennas

spaced a known distance apart. Trigonometry then gives the distance to the satellite that reflected the waves.

Meteorites annoy Minitrack. They leave trails of electrified air that reflect radio waves just like solid satellites. So the Minitrack operators throw out all sightings below 200 miles altitude—no meteorites exist above that altitude, and satellites having durable orbits don't spend much time below it. The Army's Doploc automatically ignores meteorite returns, recognizing them by their characteristically abrupt stopping rate as they hit the upper atmosphere.

How tight is the fence? The Russians could jump our space fence by orbiting a very small peeper very far out—but then they couldn't see much. At reasonable altitudes even small satellites ring the alarm.

The Deep South location of the fence, too, is not just an expression of somebody's taste for hominy grits. It follows a line that will intercept any peeper.

The laws of mechanics make satellites travel zigzag north and south—or along—the equator. They go as far south of the equator as they were north when launched, then swing back to the northern latitude again. That means the Russians couldn't possibly hang a peeper in an orbit that was always north of the fence (and hence undetectable). Theoretically, a peeper might be orbited to lurk always south of the fence. If the Russians did that, they'd get a good look at Mexico and the Panama Canal, but not much else.

No red phones. The space-fence guard posts operate round the clock, but without any sense of hit-the-button, scramblethe-jets, arm-the-H-bomb urgency.

The electronic gadgets pen squiggles on paper charts, which have to be coded and teletyped to Washington for analysis on big electronic brains. It takes 24 hours to identify an "object" positively (though the engineers can usually tell right off just from looking at the chart). The report of an "unfriendly object," if there were one, would go up through channels. Nobody has a red phone to the White House.

And why should they? The brass just smile at the big question: If you spotted a Russian peeper overhead. . . . what could you do about it?—Martin Mann.

SHOULD A CAR'S ENGINE BE IN FRONT OR IN THE REAR?

It makes quite a difference. Driving a rear-engine car is not like driving a front-engine car at all. Automotive engineers have tested many cars lately to get all the facts. The results of those tests are important to every driver in America.

To begin with, all the rear-engine cars tested were decidedly back-heavy. Such unbalanced design produces a dangerous driving characteristic called "oversteering", which causes a car to exaggerate the effects of cross-winds and even road-crowns. On the wide-open straightaways of our modern highways, where cars are often buffeted by powerful cross-winds, the rear-heavy automobile is exceedingly difficult to control.

On the other hand, front-engine cars like the SIMCA react in the opposite way. They actually tend to compensate for the slope of a road-crown, and fight back against cross-winds. The difference in handling is due to the difference in weight distribution.

And since front-engine cars are so much easier to control, it follows that they produce less driver fatigue than rear-heavy cars.

Compared with SIMCA, the rear-engine imports leave much to be desired. SIMCA outweighs them overwhelmingly. SIMCA is longer, wider, and much more powerful. SIMCA is bigger inside, with room for a family of 5 in even the lowest priced models. (\$1698 East and Gulf Coast ports of entry. Inland freight and local taxes extra.)

In overall performance, there is no comparison at all. Speed Age magazine said: "SIMCA's fantastic road-holding ability is second to none." Motor Life magazine said: SIMCA "sticks to the turns as if it were on tracks." Sports Cars Illustrated said: SIMCA "will outperform anything else in its price class."

But there's more to the SIMCA story than this page can tell. Look, why not get all the facts? Send for our free booklet. Tear out the coupon now, so you won't forget.

Chrysler Corpore P. O. Box 1919,	Detroit 31, Mich	V-70
Gentlemen: Plea new booklet, "T		
Cars Over Rear-		or kront-bugun
Name		
NameAddress		



Our Air-Crash Detectives

[Continued from page 74]

livers showed five times the percentage of alcohol found in that of the plane captain. The CAB's terse verdict: "Insufficient airspeed for single-engine operation."

Deadly cargoes. Then there was the time a perplexing explosion staggered a transport over California. The captain, leaving the controls to his copilot, found a huge hole blown in the fuselage. The plane flew on steadily, and landed safely at the next airfield. A head count showed one passenger missing. CAB investigators found his body back along the flight path, the fingers of his left hand mutilated.

Painstaking analysis of fragments found near the hole in the fuselage led to the deadpan CAB verdict: "... probable cause ... was the act of a passenger ex-

ploding dynamite."

That was suicide. When a DC-6 strangely disintegrated in flight, killing 44 persons, the investigators had a case of mass murder on their hands. Careful study of the fragments indicated an explosion in a baggage compartment. A man named John G. Graham confessed that he had put a clock-actuated dynamite bomb in his mother's luggage, and had insured her heavily.

The crash of the chartered twin-engine plane that killed Mike Todd, then husband of actress Elizabeth Taylor, was solved in hours. The pilot's manifest and fueling record showed that the plane was overloaded at takeoff by a ton. Icing had increased the load. Investigators found the right prop feathered. Inside its engine was mute evidence that the master rod bearing had failed in flight. The remaining engine couldn't sustain the overloaded, iced-up plane.

The smoke-filled plane. Perhaps the most exhaustive investigation happened years ago, when the DC-6 was new.

On October 24, 1947, United flight 608, bound for Chicago, left its runway at Los Angeles at 9:35 a.m. Captain Everett L. McMillan had eight separate fuel tanks in the wings of his plane, four main ones and four alternates, containing in all 3,350 gallons of high octane. No. 3 alternate had 302 gallons, 229 below its capacity. No. 4 alternate had 480.

McMillan had a substitute for his regular co-pilot this day. In the cabin were

Dept. L, Cleveland 1, Ohio.

Our Air-Crash Detectives

47 passengers, two of them infants, and three stewardesses.

The flight made its routine position reports. Then, at 12:21 mountain time, one hour and 46 minutes after takeoff, came this message: "United 608. We have a baggage fire aboard. We are going in to Bryce Canyon [Airport]. We have a smoke-filled airplane . . ."

At 12:26, this: "Tail is going out. We

may get down and we may not."

At 12:27: "United 608 sending blind . . ." A pause ensued, with unintelligible background conversation. "May make it —think we have a chance now—approaching a strip."

A minute later the airplane crashed,

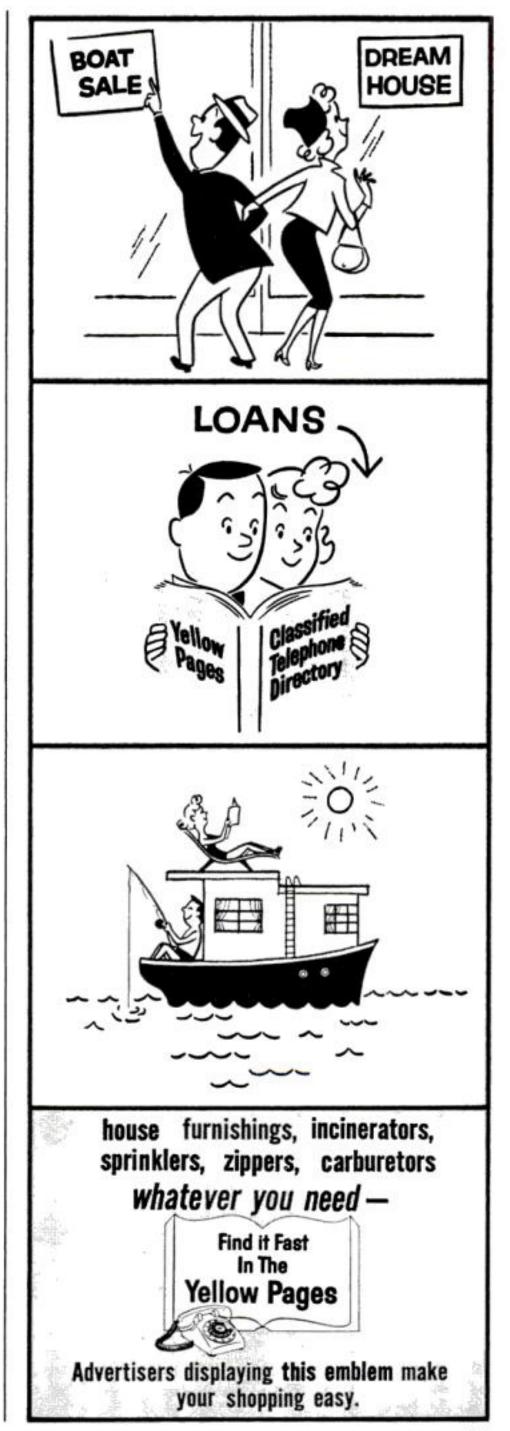
killing all aboard.

Trail of tragedy. Aided as usual by technicians from the airline and the plane manufacturer, CAB men combed the ground on the flight path, afoot and on The search horseback, for 40 miles. yielded a flotsam of tragedy—a baby's nursing bottle, a wallet, a grocery list. It also yielded barium nitrate ashes. The only known barium in the plane had been in emergency-landing flares carried in the right wing "filleting"—the streamlining strip where wing met fuselage. Had the flares ignited and caused the fire, or had the fire ignited the flares? CAB ordered all flares removed from DC-6's.

In its race to self-destruction, the plane had shed bits of skin and control surfaces, and these contained traces of fuel residue, not barium. Each of these was collected, identified, and affixed to chicken wire stretched over a wood fuselage mockup.

Meticulous study of the result indicated that the fire had begun near the "boiler room," a space in the ship's belly that housed a gasoline-fired heater for warming the cabin and cockpit. The boiler room was about at the center of the rear spar, one of the two big transverse beams in the wing. Below it, out in the airstream, was an airscoop to feed the heater. Behind that was a baggage compartment. Study showed that the fire had swept for 20 feet along the lower right side of the fuselage, and then surged up and over the top of the cabin.

Each fuel tank had a vent. The vent on No. 3 alternate contained fine traces of green stain, color of the high-test gas aboard. No. 3's vent, inboard and just





Our Air-Crash Detectives

below the leading edge of the right wing, looked dangerously placed—practically in line with the heater scoop.

That had to be it. But CAB investigators have to prove their suspicions.

A clue. At this point they got an unexpected assist. On November 11, at Gallup, N. M., an identical transport had a similar fire but—perhaps because flares were removed—managed to get down without casualties. The significant fact: A few moments before, the captain had been leveling the fuel in his tanks.

When Captain McMillan's regular copilot, who of course knew his colleague's habits, took the witness stand, the mystery was about solved. It was the captain's practice, he said, to take off on his main tanks and, after an hour or so, switch to his alternates. Then, after a period of time, he would level the alternates by pumping fuel from one to another through cross feeds. With variations, this practice was common among DC-6 captains. Another witness, a DC-6 pilot, was asked, "Can you tell in flight whether a tank is full or not?"

"No," he answered.

That did it. CAB and Douglas technicians painted a DC-6's belly with scouring powder, to retain a stain. Then they put aboard a drum of red-dyed water, to simulate gas. Aloft, they pumped the water through a hole in line with No. 3 alternate's vent. The airflow carried the stains directly into the heater airscoop.

Fuel for the flame. There remained only the inevitable hypothesis. Leveling his tanks, Captain McMillan had begun cross-feeding from No. 4 to No. 3. No. 3 filled but the electric pump was not shut off, and the tank overflowed.

The plane had declared an emergency seven minutes before the crash. Allowing a minute for the discovery of the fire, the tank could have overflowed for eight minutes. During that period as much as a hundred gallons of high octane could have poured into the heater airscoop.

The heater quickly ignited the fuel. Flames sheathed the fuselage. At least one flare ignited. Fuel lines ruptured. Control cables burned through—"Tail is going out . . ." And the crew, seeing the fire-warning light from the baggage compartment just behind, misread the cause of the fire.

GUNK-it-yourself!

Gunk® G.P. removes grease from engines or concrete floors; cleans paint brushes, power mowers, or machinery completely, economic-ally, safely. It's ready-to-use, rinses off with water, won't clog drains. Quart size with handy "Squirt Spout" top speeds application. Insist on the best degreaser - the original "GUNK" at better automotive supply and hardware retailers everywhere. ® REG. TRADE MARK.



& WASH

CAR WAS

400 AR WASH

AR WASH

CAR WASH



GUNK CHICAGO CO., River Forest, Illinois serving the Midwest and Southwest RADIATOR SPECIALTY CO., Charlotte, No. Carolina serving the East, Southeast and far West

AND SHARPEN ILER NO. 11 NO. 9 For both hand and SO EASY to joint and file saws like circular saws. new Two hardened steel rollers keep Steel rollers give teeth same height. All teeth cut, saw all teeth correct runs true and smooth. \$2.95 ppd. height, pitch and bevel. "TRU-CIRCLE" SAW SET \$9.95 ppd. Automatically sets teeth at 10° or more. \$2.95 ppd. SUPER DRILL GRINDER Sharpens round shank drills

like new, using hand or power, grinders. \$2.95 ppd. A. D. McBURNEY, 5908 Hollywood Blvd., Hollywood 28, Calif., Dept.: S-79





FIRE

YOUR ENGINE AT ALL SPEEDS WITH AUTO-LITE RESISTOR SPARK PLUGS WITH

LOOK FOR THE PROTRUDING TIP!



More aluminum, lighter weight, better performance, beautiful styling. Still World's Lowest Priced Car. Drive it for 75¢ a week. Rider Agents Wanted. If no dealer near you send 25¢ for 32 page picture book, full details, dealer price, or send \$1 (refunded first order) for this and Service Manual plus Repair Manual and 15 5x7 photos of car and factory. factory.

MIDGET MOTORS CORPORATION, Athens 2, Ohio

FROM DU PONT 11 11 11 11/



Du Pont Car Wash is the faster. safer way to wash your car. Won't harm wax, drains dry without wiping. One packet does entire car.



Simplifies Complicated Measuring

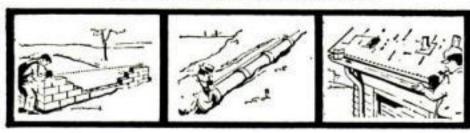


Easy as a camera to operate! One man—ALONE can do leveling and incline measuring. Accurate to a fraction of an inch. Many uses on the job and around the house.

Carpentry Leveling Patio & Terracing Duct Installation Foundation Work

Contour Plowing Brick Laying Yard Grading Irrigation Guttering Drainage Masonry ETC.

Guaranteed Product Satisfaction



If not available at your Building Supply or Hardware Dealer, write directly to:

HOPKINS MANUFACTURING CORP.

Dept. PS-4

Emporia, Kansas

Another Quality Product by HOPPY

204 POPULAR SCIENCE JULY 1959

Detroit Report [Continued from page 48]

Diesels cost up to 10 times as much as gas engines of similar horsepower, but deliver 25 to 50 percent better fuel economy, run 200,000 to 300,000 miles between overhauls.

Front-drive interest hasn't died at Ford. Engineers took a long, close look at front-engine, front-drive possibilities early in the compact-car design program before deciding on a more conventional approach. (Lack of time may have prompted the decision.) Recently teams of Ford men trooped into a dealership selling foreign front-engine cars, to study, photograph and sketch; Ford later bought two of the cars to get a closer look. Speculation is that Ford is considering front-wheel drive for future compact models.

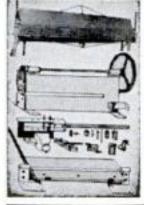
Steel bodies for Corvettes, a hardy old rumor, is getting its annual airing. Corvettes are being considerably revamped for 1960, but they almost certainly will have fiberglass bodies again. And they'll still be two-seaters, despite reports that Chevrolet will make them four-seaters.

Aluminum wheels are a definite possibility for 1960. Crash programs are underway to get them ready in time. First use will be on expensive models and perhaps for limited-production specialty cars like Corvette and Thunderbird. (See page 76 for preview of 1960's big cars.) All lightweight wheel designs so far have bonded cast-iron brake-drum liners.

Another electric car is in the works. Nuway Industries of Lansing, Mich., is developing a small two-passenger model to sell for "under \$1,500." It will have a range of 75 to 85 miles without recharging, and may be in production next year.

A booming foreign market is predicted by Chrysler's Tex Colbert. Non-U.S. markets, he says, will absorb as many cars annually by 1965 as will be sold in a normal year in this country. He expects the world market to be substantially larger than the U.S. market by 1969—a major reason behind Chrysler's decision to buy into Simca. Chrysler has just arranged to have Simcas assembled and distributed in Mexico.





SHEET METAL MACHINES

Brakes form angles, locks, pans, etc. Quick
eccentric clamp. All steel construction.
ter in clamp. An steel construction.
15"—16 gauge steel\$28.00
36"—22 gauge steel\$37.00
48"—24 gauge steel\$52.00
Floor stand \$ 8.00
15"-24 gauge Folder\$17.50
36" Pan and Box brake\$60.00
14 x 3 Adjustable Bender\$14.50
16 gauge 7" Bench Shear 3 adj. gauge\$16.50
Electric Shear, 24" reach\$48.00
ORDER DIRECT OR SEND FOR FREE CATALOG
VYKE MFG CO., N-4158 Jason St., Denver 11, Cole.

BUILD YOUR OWN CONDITIONERS

From Junked Refrigerators for a Few Dollars INSTRUCTION BOOKS SHOW YOU HOW. . 75c EACH

"HOW TO BUILD a Low Cost Air Conditioner"
"HOW TO BUILD an Automobile Air Conditioner"
"HOW TO BUILD a Low Cost Home Freezer"
"HOW TO BUILD a Low Cost Pecipitator"
"HOW TO BUILD a Low Cost Dehumidifier"
Complete "Install-It-Yourself" Air Conditioner kits for home and automobile, 2 Ton capacity, Brand New Parts—\$119.00 and up.

Instructions and Literature on kits.

Kool Engineering Co., Dept. R-7, 1318 N. Clyburn, Chicago 10, III.



EXCLUSIVE DOUBLE-BEARING **HEAVY DUTY PUMPS**

IRRIGATE . DRAIN . CIRCULATE . SPRAY

LABAWCO PUMPS, Belle Mead 4, N. J.

CUT ANY SIZE - ANY SHAPE WITH Spearhead Cutter

Handy pocket size - cuts leather, asbestos, rubber, cork, etc. -round 1/4" to 6" - any size Send Check or

straight and odd shapes. Money Order! **Q**35 POSTPAID

ZIMMERMAN PACKING CINCINNATI 12.

REPAIR MOST EVERYTHING MADE OF METAL Home Appliances, Auto parts, Farm-garden equi



lawn chairs, tables, orna-

lawn chairs, tables, ornamental iron work, gates, wagons, etc. Solder, heat, bend, and straighten, with terrific heat from arc torch.

Cut and weld up to 1/4" steel plate, A million uses for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, factories, etc.

Works from any home 110 wentors, for Home, auto, farm, inventors, for Home, auto, farm, inventors, for Home, auto, farm, inventors, factories, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was a set to the for Home, auto, farm, inventors, was

Shake \$425 hands with a JET ROCKET You can feel the dynamic power and balance in this famous tool. You'll enjoy the aliveness of the JET ROCKET as it centers the power of your swing and smoothly absorbs impact shocks. Head is permanently locked to tubular-steel handle. Comfortable cushion grip won't slip, even when wet. Shake hands with a JET ROCKET at your favorite hardware store today. True Temper, 1623 Euclid Avenue, Cleveland 15, Ohio. Also see the ROCKET® at \$5.25, with polished octagon head it's the carpenters' favorite. ROCKET and JET ROCKET are excellent nail pullers. RUE LEMPER THE RIGHT TOOL FOR THE RIGHT JOB

developed by the editors and electronics engineers of Popular Science Monthly. A pair of Hi-Fi tools that no Hi-Fi fan can afford to be without - completely different 33% L.P. Test Records!

ONLY list price both volumes \$3.98 each

YOU MAY WANT TWO OF EACH! SPECIAL DISCOUNT ON SECOND SET! TWO SETS COST YOU ONLY \$10.00.

Extra Hi-Fi Test Records make unusual gifts or you may want to keep them, unplayed, as a reference standard to check the ones you use regularly.

EACH RECORD SERVES ITS OWN PURPOSE...

Test Record Vol. 1

"Testing With Sine Wave Frequencies," uses electronically produced tones to analyze each component in your hifi set.

- Band of pure sine wave sweep frequency-continuous from 20,000 to 20 cycles. Plus a continuous sweep from 300 to 20 cycles, with frequency markers every 50 cycles - ideal for tuning bass-reflex and other speaker enclosures.
- Turntable rumble test with 1000-cycle reference signal recorded at precisely 7 cm/sec adjacent to one minute of silent grooves.
- Stylus test with a signal recorded at extreme outer groove for comparison with the same signal recorded at innermost groove - a revealing test for stylus wear or pickup-cartridge deficiencies.

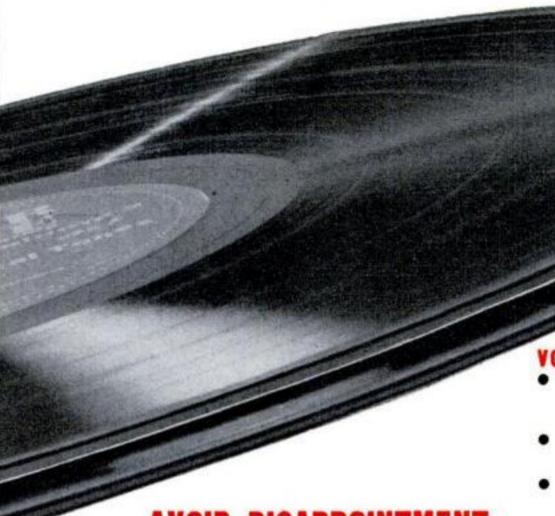
Test Record Vol. 2

"The True Sounds of Musical Tones," consists entirely of life-like tones of the actual instruments of a symphony orchestra - employed in a unique way to let you hear how your set gives out with real music.

special price for

- Explores the personality of orchestral instruments different instruments, played solo and in orchestra, demonstrate their distinctive sounds.
- Tests bass response with actual music musical instruments measure the useful low-end response with a special technique.
- Shows how high frequencies give realism to music - calibrated filters check the upper limits of your hi-fi.

POPULAR SCIENCE HAS THE ANSWER!



AVOID DISAPPOINTMENT WHEN YOU BUILD OR **BUY NEW EQUIPMENT**

The Popular Science Test Records work as a team to give a Hi-Fi system the most thorough workout. When you buy or build new equipment or to get the best out of your present rig, play the P. S. Test Records and listen to the sound from your loudspeaker - pinpoint faults that mar your listening pleasure. No fault can hide from the revealing tests that you can make yourself with these two records.



Attractive Albums and Full Instructions

The records come to you in protective dust sleeves and enclosed in attractive albums. Complete instructions for using the records are printed on the back liner of the albums.

HERE ARE JUST A **FEW ADDITIONAL FEATURES** OF THESE AMAZING RECORDS

Tune speaker enclosures just right—by ear . . . A low-frequency glide band makes it easy to adjust the reflex port, detect faulty construction and smooth out speaker response.

Discover how quiet or noisy a turntable is . . . Silent grooves, cut on the quietest recording lathe known, reveal rumbles in disk-turning mechanisms.

Show up worn stylus or poor tone arm . . . By sound alone, tone bands tell whether your stylus is defective or tone-arm resonance too high.

Test the setting of equalization controls . . . One special band helps set equalization or tone controls to

cial band helps set equalization or tone controls to match the standard recording curve.

Challenges you to name common sound effects . . . A quiz band of everyday noises makes an amusing party game—and reveals how good a system really is.

Check transient response and dynamic range... These determine crispness and contrast in your sound. The record can find a fault and trace it to

Explore the personality of orchestral instruments...

Different instruments, played solo and orchestra, demonstrate their distinctive sounds.

Test bass response with actual music... Using a special technique, musical instruments help you measure the useful low-end response.

Shows how the high frequencies give realism to music... Without the highs, a group of instruments will sound alike. Calibrated filters are used to check the upper limits of your high. the upper limits of your hi-fi.

Magazine Services, Inc. Department R-759 355 Lexington Avenue, New York 17, N. Y.

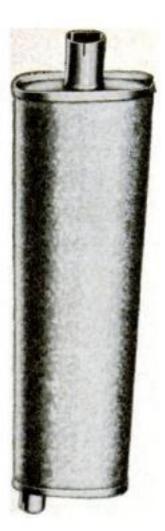
Please send me, postage free, and fully guaranteed, the Popular Science Hi-Fi Test Records checked below. Check or money order is enclosed.

- \$3.50 for Vol. 1
- \$3.50 for Vol. 2
- \$6.00 for both Vol. 1 and 2
- \$10.00 for 2 sets Vol. 1 and 2

Name

Address_

City, Zone & State_____



Read the truth about why all mufflers wear out...

AND WHY
SILENTONE LASTS
LONGER, SAVES YOU
MONEY

It's true that mufflers wear out in many ways. They can blow out, fall off, vibrate apart, or get punctured. But the vast majority of mufflers simply *rust* away. This is due to acid condensation inside the muffler and the acids eating away at the inner parts and outer shell.

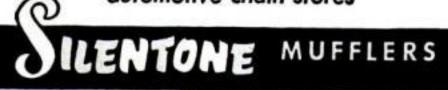
Good internal design minimizes condensation by causing hot exhaust gases to heat all the chambers evenly, eliminating the cold chambers where condensation occurs.

To be additionally sure the muffler you buy will stand up longer, buy a muffler made of heavier steel.

The Silentone double shell has up to 33% heavier steel than other mufflers use and is zinc coated as well. Outer heads are heavier, too—made of 16 gauge steel, spun-locked into place to eliminate blowouts. Even the inner parts are heavier.

Silentone's rust-resisting construction adds up to a 33% bonus service life and thousands of extra driving miles. Yet this premium muffler will actually cost you less. There's a Silentone designed for every make and model car. Why not write for free Silentone literature.

Sold only by America's leading automotive chain stores



DYNATONE • GLASS-PACKED

Dept. 4C, Toledo 1, Ohio

208 POPULAR SCIENCE JULY 1959

If Disaster Struck . . . [Continued from page 125]

with no particular function in disaster answer the distress call.

The public anticipates needs

In the Waco tornado, all radio and telephone communications were cut off, but within one hour after the disaster, people were lined up outside the Blood

Center waiting to give blood.

The outpouring of unsolicited contributions often is staggering. In White County, Ark., so much unsolicited clothing, food and other material came in for tornado victims that 500 volunteers were needed for two weeks to sort it. Much of the material was useful, but queer items also turned up—a tuxedo in good condition, high-top button shoes, derby hats, and a big carton of falsies.

There is very little looting

Contrary to a popular idea, little looting or thievery occurs. Even in World War II bombings, with plenty of opportunity for looting, much less of it went on than might be supposed. After the Waco tornado, although the contents of jewelry-store windows were scattered over the sidewalk, little looting occurred. But there may be souvenir hunting—especially among people from outside.

There is a disaster syndrome

In some people, temporary paralysis does occur after a major disaster. They seem dazed, shocked, numbed. For a time, they may sit or stand motionless or wander aimlessly. They express no grief, fear, or other strong emotion. The paralysis may persist for minutes or hours.

The next state may be one in which the victim is grateful for help, and is obedient and docile. He may even take

some part in rescue work.

The third stage, which may come in hours or days, is one of euphoria. Now, the individual is happy to be alive and eager to work for the community.

Many disaster victims feel a lift

A temporary improvement in mood has been noted among many disaster survivors.

SURPLUS ESECUTES SA



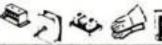
ELECTRIC ACTUATOR Terrific power. 24 V. or AC operation with stepped down transformer. Small compact unit, will operate garage doors, rotating antennas; for boats, heavy drapes and wherever mechanical action required. Has two splined 1.2" takeoff shafts, 45 RPM, Gear ratio 440 to 1, Approx, GOVT, COST 897, NOW \$8.75 ppd.

"DELUXE 11" ARC WELDING KIT Consists of 160-250 AMP. Gen., voltage reg., ammeter, shunt, adjustable helmet, electrode holder, pr. welder's gloves, 30' welding cable, reactor coil, giant toggle switch, rheostat. Approx. GOVT. COST \$650. All units guaranteed pre-tested. \$34.95

complete.









"SUPER 9" 200 AMP WELDING KIT
With Deluxe accessories consisting of one 200 AMP. Gen., adjustable nelmet, electrode holder, 30" welding cable, rheostat, giant toggle switch, voltmeter, voltage reg., 1 pr. heavy-duty welder's gloves. All units guaranteed pre-tested. Approx. GOVT. COST — \$500. Most items new — all perfect, \$26.00.



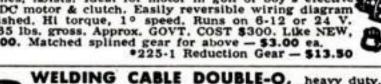






140-1 REDUCTION GEAR For beaching boats, winches, hoists. Ideal for motor in golf or boy's electric car. DC motor & clutch. Easily reversible wiring diagram furnished. Hi torque, 1° speed. Runs on 6-12 or 24 V. Wt. 65 lbs. gross. Approx. GOVT. COST \$300. Like NEW, \$12.00. Matched splined gear for above — \$3.00 ea.

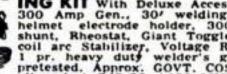
*225-1 Reduction Gear — \$13.50



WELDING CABLE DOUBLE-O, heavy duty, neo-prene jacket, fiberglas insulation, NEW, Approx. GOVT. COST \$40. Will handle 400 amps, or better, 50' lengths \$14.50. 100' lengths \$26.00.

WELDING REACTOR for all listed generators, 200 AMP. capacity or better, NEW, \$7.95, 300-400 AMP, NEW, \$10.95,

"BIG 12" ARC WELDING & BATTERY CHARG-



ING KIT With Deluxe Accessories consisting of one R1 300 Amp Gen., 30' welding cable, welder's adjustable helmet electrode holder, 300 AMP ammeter, 300 AMP shunt, Rheostat, Giant Toggle Switch, 300 AMP reactor coil arc Stabilizer, Voltage Reg., Reverse Current relay, 1 pr. heavy duty welder's gloves. All units guaranteed pretested. Approx. GOVT. COST \$750. Most items new—all perfect, \$49.50. *400 AMP Gen. with above accessories—\$64.50.











SPLINE COUPLING for PI and RI Gen. Keyway slot for direct hookup to engine or motor. Double set screw for tight fit installation. Heavily constructed, will handle any job. NEW. \$4.95 ppd.

11 PIECE CROWFOOT WRENCH SETS Wrenches snap onto T-bar in 3 different positions.
The only wrenches for hard-to-get-to places. Mfd.
by Plomb Tool Co. for U.S. Armed Forces, Finest
case hardened tool steel. No shop mechanic should be without this set. Approx. GOVT. COST \$47. NEW. \$5.95 ppd.

Runs on 12 or 24 V. Centrifugal type. Draws 5.2 AMPS. Has built-in removable filtering screen. Great for bilge, circulating or sump pump...bait tanks, etc. Pumps 500 GPH. Complete with on and off switch rheostat, 2 speeds (hi & lo). Mfd. by Ingersoll-Rand. Shpg. Wt. 7 lbs. Approx. GOVT. COST \$195. NEW \$8.95.



NEW 1960 CATALOG!

gest ever—fully illustrated—1000s of bargains in war surplus & other items. Send 25c in coin for your copy today!

Where ppd. indicated applies to US only, Other prices FOB

Culver City, Cal. Send cash, check, money order, 500; dep. COD.



AIRBORNE SALES CO., INC. DEPT. PS 759
8501 Stellar Drive, Culver City, Calif.

PERMANENT, NON-ELECTRIC. HIGHLY PRACTICAL. AMAZING,

MIAMI MAGNET COMPANY, 3240 N.W. 27th Ave., Miami 42, Fla.

FREE Send for this Free folder on the finest tools made. Drills, saws, hand tools, the famous Dyno-Mite® Workshop, and many more.



MILLERS FALLS CO. Dept. P5-29 Greenfield, Mass.



*********** HOW TO PROTECT YOUR INCOME!

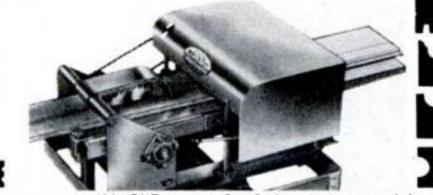
Earn Extra Money With A Rapid SHEAR SHARPENER



type sharpener does a perfect job in just 2 minutes on all types scissors and shears, including pinking shears. Knife guide puts proper edge on any blade, Knife serrating attachment puts saw-tooth edge on hard or soft steel blades, Quick profits from homes, dressmakers, barbers, restaurants, notels, butchers, etc. No experience needed. Big opportunities with this precision ball bearing machine. Has ¼ h.p. motor. A money-making investmentwrite for FREE FOLDER PS-7.

BEAVER MFG. CO P.O BOX 434, 800 So. Isis Ave. Inglewood, Calif.

NEW BELSAW MULT SAWS-PLANES - MOLDS



Now you can use this ONE power-feed shop to turn rough lumber into moldings, trim, flooring, furniture...ALL popular patterns. RIP...PLANE...MOLD...separately or all at once with a one HP motor. Use 3 to 5 HP for high speed output. Fully Safe-guarded. Low Cost...You can own this power tool for only \$30.00 down payment.

Write TODAY for Free Catalog BELSAW POWER TOOLS, 920 Field Bldg., Kansas City 11, Mo.



"ALWAYS USE ME TOO!"

LIQUID WRENCH UPER (

The very finest lubricating oil available for machinery, watches, sporting goods, sewing machines.





HINGE LOOSE?



For surest results always use GENUINE

Handles like putty—hardens into wood!

Refinishing's EASIER WITH

Heavy-Bodied KLEAN-STRIP PAINT REMOVER

LOWEST PRICED WATER-WASHABLE

Peels off paint and all other finishes quickly, easily. Non-inflammable and needs no neutralizing. Use for either wash-off or scrape-off removal. Write for free folder describing a professional's way to remove old finishes. The Klean-Strip Co., Inc., P. O. Box 10083D, Memphis 6, Tenn.

If Disaster Struck . . .

It appears to be based on a sense of cooperation and helpfulness, along with dedication to the job of restoring what has been destroyed. In the Worcester tornado, a University of Pennsylvania investigator has reported, almost everyone shared in a "surge of concern for the welfare and restoration" of familiar community objects.

"The net result is often a dramatic increase in social solidarity"

So reports the Committee on Disaster Studies. When people share suffering and a threat to survival, they rise above pre-existing social distinctions. But if there is no persistent threat, once emergency tasks are over it gradually disintegrates. Yet its temporary emergence, say the investigators, is of major value in helping disaster victims overcome the shock of injuries and losses.

Permanent mental illness is rare

Although most people who experience a disaster suffer some form of emotional after-effect—sometimes also developing headaches, stomach troubles and other physical disturbances as the result of fear and anxiety—the emotional and physical disturbances rarely are severe and longlasting. In only a few cases is psychiatric treatment needed.

People have a remarkable ability to endure great suffering, survive—and then risk their necks again

A medical report by the physician who went into the wrecked Springhill, Canada, mine last October and treated the 19 survivors provides some data on endurance. The men were rescued after waiting seven to 81/2 days in the blackness.

Several of the men were injured-yet their companions reported that they had made no complaints.

Several were also survivors of a 1956 explosion. "I doubt," reports the physician, "if there will ever again be any large-scale coal mining in Springhill, but I am certain that if the mine were to reopen, men who survived one or even both disasters would very soon get back to work."

SURPLUS URPLUS BANKRUPT STOCK

FARMER-CONTRACTOR PUMP • Item = 200, 21/2" size, 16,500 gph. New ballbearing centrifugal irrigation-contractor pump. 280 gpm. 65 ft. head, 6" pulley . . 212" intake. 2" discharge. Wt. 37 lbs. Govt. COST \$98. \$49.50 FOB



FISH-WORM AC SHOCKER



worms, clear private ponds of coarse fish. 110-v AC hand geared generator creates powerful electric field in ground or water. Amazing results. Fascinating, use for Covi. cost over \$200 Performance. fun at parties. Govt. cost over \$3.89 Ppd

ELECTRIC CAR MOTOR



 Item #576. Powerful gear motor, Hi torque. Build boy's car,

golf cart, winch, elevators, etc. Runs on 6 or 12-v battery. Reversible, Gear ratio 33 to 1. 190-150 rpm. Ball bearings. Shaft % diam. Size 15½ x5¼. Wt. 30 lbs. \$15.79 F.O.B.

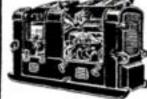
ICE AIR CONDITIONER

 Twin blower, 2 cans. Special liquid. Freeze cans, place in unit. Safe even around bables, 110-v. 60-c. Wt. 14 lbs. Nat. Adv. \$39.50. SALE \$12.91 FOB



ARMY POWER PLANTS

• Amazing buys—finest DeLuxe Govt. 115-v. 60-c Power Plants. Large selection. Write for catalog. Save 60 %.



● 1000-w 3000-w 5000-w Others DC Generator buys! AC Generator buys! 79.50

STANDARD DIAL PHONE o item #715. Modern hiefficiency attractive dial
phone. Use for extension to
main line on private system. Use several for complete private system, etc. Complete. Work on any system, Gov. plete, Work cost \$25.00. SALE.....

\$9.95 Ppd. HYDRAULIC EQUIPMENT BARGAINS

CONTRACTORS LEVEL-TRANSITS

e item #804. Leading make, brand new latest model level-transit with tripod and case. Used by leading builders, schools, etc. 12-X scope, high accuracy, use as level or transit. Limited time offer. \$69.95 PPD high accuracy, use as leve transit, Limited \$69.95 time offer.

• Many other instrument buys.

MOWERS

PLOWS



SPECIAL OF THE MONTH!

Hi-Speed Vacuum-Blower Unit

Heavy duty industrial hi-speed AC motor driven vacuum-blower unit. Useful sucking dirt, sawdust from power tools such as bench saws, shapers, etc.



Makes marvelous unit for simple pneumatic tube system (plans furnished) for factories, stores, etc. Many other uses.
Electric solenoid permits selection of either of two tubes. Hi-speed 110-v 60-c motor. Powerful valve operating solenoid, 110-v AC. Openings 2" diam, inside. Size 6"x18"x9". Wt. 10 lbs. Heavy aluminum construction, Only 81 units. Original cost \$69.50, SALE.....\$18.95 FOB

WELDING GENERATOR

 Famous new-condition P-1 200-250 amp aircraft generator, 1000s giving excellent service as welders. Other uses are DC power plant, fast battery charge.



fast battery charge.

Easy to adapt into portable welder, using 10-12 HP engine or drive off tractor pulley. 200-250 amp 24/30-v, 2500-4500 rpm. Size 15"x6". Wt. 48 lbs. Govt. \$18.95 FOB



Use Your ¼" Drill To START GASOLINE ENGINES

PUMPS New Adaptor easily added to (retains) rope ETC. or recoil starters. Fast safe starts to 21/2 hp with drill of adequate amps. Fits big drills for higher hp. No special tools, full instructions. Specify shaft thread size & direction-rotation of engine (clock-wise or counter). \$3.50

P.O. Box 87; Station H, Buffalo 14, N.Y. (\$4.95 Recoil)

Saving for Security Is Easy

It's actually easy to save money-when you buy United States Series E Savings Bonds through the automatic Payroll Savings Plan where you work!

RE-POWER NOW with a V-8 engine—Use MERCURY CHEVROLET FORD • •

in 2 or 4 Whi-Dr. Jeeps, Jeepsters, Sta-Wgn, Trucks. H.J. and Kaiser cars. Conversion Kits \$43.25 to \$59.85. If you want fast action tell us which engine you wish to use, give us year, Model, (2 or 4 Whi-Dr), of your vehicle, Send Min. \$15.00 Dep, and we will ship correct kit. Bai. COD. Send full amt. for Prepaid shipment. Wire, phone or write for free details. (Also kits for Ford 6 engine.)

HOOSIER MACHINE PRODUCTS CO.
314 S.E. 6th St. Phone CR6-3442 Pendleton, Oregon

STOP FRONT END DRAG on your 4-WHEEL DRIVE with WARN, HUBS! Free-wheeling 2 w.d. with Warn Hubs means big

Models for

all 4 w.ds.

to 1½ tons

savings in gear, engine, tire wear, gas, plus more pep, performance, power in high and easier steering. Hubs proved in over a billion miles of use. Get drag-free 2-wheel drive or tractive 4-wheel drive automatically, as you shift, with Warn Lock-O-matics; manually with Warn Locking Hubs. Unconditionally guaranteed. Ask your local 4-wheel drive dealer to install Warn Hubs today!

NARN MFG. CO. Riverton Bx 6064-B, Seattle 88, Wn.

FREE! DELTA HOMECRAFT CATALOG

A valuable addition to your home workshop library! Pictures and describes every tool in the world's most complete line of power tools for home workshops—includes individual, combination and all-purpose tools. Tips on tool care, handy "how to" hints, plus details on hundreds of money-saving accessories. Write: Rockwell Manufacturing Co., Delta Power Tool Division, 504-G N. Lexington Ave., Pittsburgh 8, Pa.



America's Finest Car Care Combination MAC'S-IT KIT

MAC'S SPECIAL CLEANER quickly removes road film and chalked pigments from all auto finishes. Makes a perfect base for MAC'S-IT SUPER GLAZE, the exclusive paste-type formula with imported resins that actually harden the paint itself. Now, both CLEANER and GLAZE are packed together in this handy kit. At service stations everywhere.



SUPER GLOSS CO., INC.

Los Angeles 42, Calif. . Cincinnati 26, Ohio

SUPER GLAIL

MAC

EDAL CLEANE

DON'T WAX IT, MAC'S IT!



City

State

There's Money in Marinas [Continued from page 130]

water. You will need a system for moving boats around on land. Some marinas use fork-lift trucks or hand-pushed dollies, others use miniature railways or overhead monorails. There must be land space for dry boat storage and slips for in-water storage.

You can do a lot of this building yourself, using detailed plans from the organizations mentioned. Or you might consider ready-made docks and floats sold by companies like L. B. Foster Co. of Chicago; Standard Steel Products Mfg. Co. of Milwaukee, Wis.; and Sagen Boat

Hoist Co. of Weedsport, N. Y.

Dredging is one thing you can't do easily for yourself. And it's a rare site that doesn't need at least a little to create a marina. Because this will be a major chunk of your early costs, before you buy figure closely how much dredging must be done. "Dredging can break you before you start," says Vincent Bravo, founder of Seaford-Mar Marina.

Marina men say there should be a depth of at least five or six feet at low water. Some dredge to 10 or 12 feet to allow for silt pile-up over the years. The cost of dredging varies widely, depending on the kind of bottom, how far the material must be moved and many other factors. On the average, it runs something like 40¢ to 60¢ per cubic yard of bottom removed. But you'll be wise to get a contractor's estimate before buying.

Be careful, too, to study all rules and regulations governing a site. Federal, state and local laws can make the bestlooking site as useful for a marina as the middle of the desert. The Army's Corps of Engineers, for instance, may forbid structures that protrude into the water from that particular shore. local zoning may allow only residential occupancy there.

In California a marina planner bought a lake site and found out later that a local law forbade septic tanks within a mile of the shore. To build a clubhouse and restaurant would have meant running several miles of pipe to the nearest sewage line. Disgusted, he sold the site.

You will also want to do some careful guessing about potential business at this location. "The owner of a marina should realize that it may be in competition

Send Check or Money Order



LIMITED SUPPLY! BRAND-NEW, BALL BEARING SINGLE PHASE ELECTRIC MOTORS FAMOUS BRAND! SAVE WAY OVER HALF

Powerful CAPACITOR MOTORS with heavy starting torques to handle every heavy-duty job. NEW, ball bearing models that mount IN ANY POSITION. 230-Volts, 1140 R.P.M. 60 cycle, single phase. Standard mounting and shaft size. PERFECT FOR: refrigeration, saws, machine tools, blowers, grain elevators, wood-working tools, pumps and farm equipment. FULLY GUARANTEED! Save \$888.

ORDER DIRECT FROM THIS AD TODAY! 1½ HP (Reg. \$172.00) 1140 RPM, Ball Bearing only \$57.50 fob 2 HP (Reg. \$231.00) 1140 RPM, Ball Bearing only \$79.50 fob 3 HP (Reg. \$292.00) 1140 RPM, Ball Bearing...only \$115 fob

Free Catalog of Machinery Wholesale Buys Phone Taylor 9-1365 ROBERTS ELECTRIC CO., Dept. PS-939, 849 W. Grand, Chicago 22

Your Dollar Will Feed A Refugee

War and political refugees overseas urgently need the direct help, the personal encouragement, of CARE food packages-\$1 for 22 lbs. of farm staples, Delivered In Your Name. Mail your dollars to "Refugee Campaign," CARE . . . today!



660 First Ave. New York, N. Y.

Printed as a public service

When Writing to Advertisers Please Mention Popular Science

"VISE-GRIP DID OUR TOUGHEST JOBS ON THE OCEAN FLOOR"

The True Story of Jess Masters, Santa Barbara, Calif.



"As a diver I always carried a Vise-Grip. It held where no other tool would . . . like pulling a cable to open sealed hatches! One time my buddy tore his rubber suit on a sharp rock; water began to seep in. A Vise-Grip, clamped over the tear, stopped the leak. And he came up safely. Every salvage diver I know uses Vise-Grip in his work. It's that handy!"

VISE-GRIP Does More Jobs Easier Than Any Other Tool

You'll find bundreds of uses for powerful, all-purpose Vise-Grip. It's a pliers, wrench, clamp, hand vise, wire cutter-all in one tool! Ask for the new Vise-Grip with Easy Release. Only \$2.15 to \$2.95 at your hardware store.



MFG. COMPANY

DeWitt, Nebr.



Get New 132 Page Catalog of AND WOODWORKING MATERIALS

WORLD'S LARGEST SELECTION—Lowest Prices Your buying guide for finest kiln dried domestic and rare imported woods, inlays, bandings, matched ply-wood, mouldings, ornaments, etc. Biggest selection of tools and hard-to-find hardware. Packed with scroll saw patterns, projects, wood facts and money mak-ing ideas. Enclose 25c (refunded on first order) to help pay mailing and handling costs. Write today to CRAFTSMAN WOOD SERVICE COMPANY 2729 S. Mary Street, Dept. B-7, Chicago 8, III.



welding machine by simply connecting a Hobart generator to a good used auto engine. Write for free booklet.

'Weldor's Vest Pocket Guide

0

NEW, LOW COST A.C. WELDER for shops, garages, farms. Profitable and easy to use.

> Save time, money and replacement parts. Do your own repairs, construction and metal fabrication. Ideal for those quick money-making jobs around farms, shops

NEW "SIMPLIFIED" A.C. HOME TYPE WELDER for 110V or 220V

> Just the thing for the home workshop, Just plug it in. Not a toy, but a real, easy to use, very low cost welder.

Write HOBART Brothers Co., Box P-79, Troy, Ohio, Phone FEderal 2-1223



There's Money in Marinas

with others as far as 50 miles away," warns the NAEBM. Boating people travel far to reach water and you will have to do the same in sizing up activity.

"Pick a sunny weekend," one marina man suggests. "Then spend a day hanging around your site to see how much transient business floats by." These boat owners may not bring you any slip rentals, but they'll buy your gas, ice, food, fishing supplies and sundries. The Outboard Boating Club says that you can attract more transients by locating near a shopping center where boaters can buy groceries and other nonmarine items.

You can build a marina in stages, financing additional facilities out of income as you go along. But whether you build a little at a time or all at once, a long-range scheme is essential. This means working out a detailed plot plan of the site and indicating where everything will be in the completed version. Otherwise you may find that the original improvements are in the way of later expansion—usually an expensive mistake to correct. Consider adjoining property, too, if you can be sure of buying it later.

The first stage should include these rock-bottom essentials:

Navigable water

- Boat launching and hauling facilities
- Docks or slips for in-water storage
- Fueling equipment
- Dry-storage space for boats
- Parking space for cars

The second stage can include these important, but not essential, additions:

- Repair shop and paint shed
- · Marine hardware and supplies store
- · Covered storage for boats

The final stage would add these lucrative fringe facilities:

- Restaurant and clubhouse
- Boatel (marine version of a motel)
- Boat salesroom
- Swimming pool.

Whether you should plan to go all the way or stick with a modest layout depends on many things. A simple marina run by a husband-and-wife team, for example, can make out nicely. No regular help is needed and customers get the personal attention that builds good will. Investment, upkeep—and income—are of course correspondingly less than for a full-scale layout.



sional results. Dealers - Agents Inquire. Send 25¢ for 3-Colored Catalogs 52 pg. Kit Catalog plus 20 pg. Hardware and 8 pg. Armor Glass books. (SPECIAL OFFER!)
All 3-colored CATALOGS plus

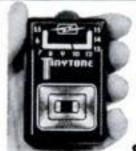
"Boating Handbook"...all for \$1.

CUSTOM • CRAFT

Frame Pak Kits. Prams, Kayaks, Racers, Runabouts, Catamarans, Cruisers-In-Outboards (6' to 40') Wood, Plywood and Steel. Sond 354 for 120 pg. Plan Catalog. Catalog plus "Boat Building Handbook"... Send \$1.00.

Buffalo 7M, N. Y.

TINY RADIO PLAYS FOR 10 YEARS!



NO TUBES-TRANSISTORS-BATTERIES OR "PLUG-INS" NEEDED

Smaller than a pack of cigarettes. 1960 model never runs down or burns out. Guaranteed to receive local radio stations most anytime, anywhere—without EXTRA ANTENNA WIRES. Easy thumb station tuner—Perma wave detector. Chrome black plastic case, BUILT IN SPEAK-ERPHONE — NO SEPARATE DANGLING EARPHONE. American made and service guaranteed for 10 years.

SEND ONLY \$2.00 (cash, ch, mo) and pay arrival or send \$6.99 for postpaid delivery. Sent complete—Ready to listen with 10 year guarantee. No extras to buy. Free 1000 mile antenna enclosed if you order at once. MIDWAY COMPANY Dept. TPS-7 KEARNEY, NEBR.



HEAVY DUTY TYPE ALLEN PUNCH PRESSES

Model BT-12 12 Ton \$437.50

f.o.b. less motor Hundreds of Different
Model Combinations
1 to 12 ton capacities
Moderate in price
Fully guaranteed
See your supply dealer or write
for Free catalog giving complete
information and prices on Allen
line of Punch Presses.

ALVA ALLEN INDUSTRIES, Dept. PS, Clinton, Mo.

Something new is in the hopper For the smart workshopper On the level A split-level,—that is! See August POPULAR SCIENCE for your next clue.

ELD IN A JIFFY!

BACH BE-BOP



On patio, lawn, or pool... enjoy outstanding high fidelity sound with University's weatherproof dual-range 'LC' speaker systems

The exceptionally efficient 'LC' speakers connect to your amplifier, phonograph, radio, or TV...to cover any area you desire with high volume quality sound. Leave in place rain or shine, season after season . . they're rugged and dependable. Each model is a true coaxial speaker with separately driven woofer and tweeter. For complete details, write Desk B-1, University Loudspeakers, Inc., White Plains, N.Y.



fiberglas reinforce



Medel BLC: for wider coverage. All metal construction. \$53.70



BURNING

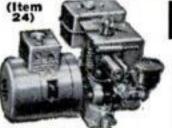
OT MAXIMUM ENGINE POWER

STOP EXHAUST SMOKING!

AT SERVICE STATIONS, GARAGES, **AUTO ACCESSORY STORES**

RADIATOR SPECIALTY CO. CHARLOTTE, N. C.





Watt Light Plant PUSH BUTTON

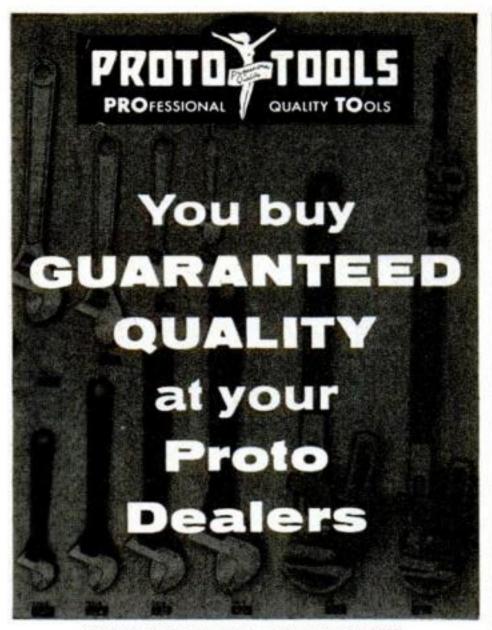
115 v. 60 cyc. AC Powered by a rugged 2.2 HP, easy starting Briggs engine. No wiring necessary: just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 ibs. Easily fits in car trunk. Be prepared fits in car trunk. Be prepared \$143.50 complete with voltmeter and engine with 50 complete with single fits in car trunk. Be prepared \$143.50 complete with single fits in car trunk.

We make all sizes up to 25,000 watts. Send 10c for catalog MASTER MECHANIC MFG. CO., Dept. B-79, Burlington, Wis.

Now any one can weld, cut, braze or solder almost any metal quick, safe and easy with this professional type welder. Make repairs in home or shop and farm; repair auto bodies and fenders, build wrought iron furniture, railings, fences, etc. - 1001 metal items. No previous experience necessary. Designed to operate on any properly wired 110 V. A.C. line, Order today! Literature on larger industrial equipment on request.

SEND ONLY \$6.00 EASY CHECK. CASH or M.O. PAY PAY PLAN ment. Pay as you PLUS CHARGES, 1 YEAR POSTMAN BALANCE Low down pay-GUARANTEE. 10 DAY USE. Money back MONEY BACK guarantee. Act now! TRIAL

DYNAMIC WELDER COMPANY, 1808 S. Federal St., Dept. D3-G, Chicago 16, III.

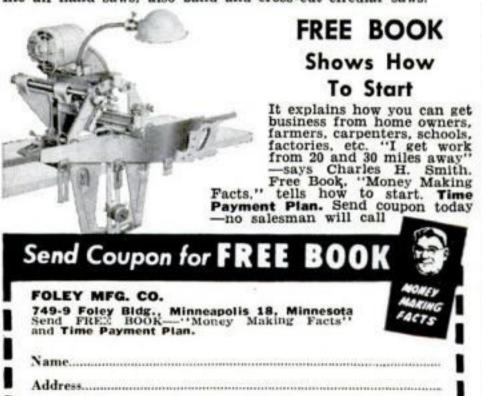


2203 Santa Fe Avenue, Los Angeles 54, Calif. 503 Allen Street, Jamestown, New York 1703 Oxford East, London, Ontario, Canada

PROTO IS A DIVISION OF PENDLETON TOOL INDUSTRIES, INC.

9110120 \$20 to \$30 a Week EXTRA MONEY!

With the high prices of food, clothing and everything else, just think what you could do with extra money every week! Turn your spare time into CASH—sharpening saws with a Foley Automatic Saw Filer pays from \$3 to \$6 an hour. Start in your basement or garage—no experience necessary. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons. No canvassing—"I advertised in our local paper and got in 93 saws"—says M. L. Thompson. With a Foley you can file all hand saws, also band and cross-cut circular saws.



There's Money in Marinas

A marina that offers maximum service does get a bonus for the extra investment and work, however. This comes in the form of higher rates. Boat owners are willing to pay a premium for the convenience of a complete range of facilities.

According to a 1958 NAEBM survey, the minimum-service marinas were averaging \$64.96 per season for use of a slip by a small boat. Maximum-service marinas were getting twice as much for the same thing. So if you're aiming for big money, it pays to expand rapidly.

Few prospective marina operators have enough savings to finance a complete installation. But you may find ways to ease the financial burden until the business begins to pay. These have worked:

 Going into partnership, borrowing from friends or forming a corporation.

Buying a site with savings, then borrowing construction money against it.

 Continuing temporarily on a regular job and working at the new marina on weekends. A willing wife can handle weekdays, when the pace slackens.

 Selling your house for an investment and living in a trailer or houseboat on the site while building a house there.

 Getting help from local businessmen who stand to gain. Example: a home builder who needed fill and also saw added appeal for his homes nearby.

 Selling concessions to a restaurateur or marine-hardware dealer who will set up desirable facilities at his own expense.

 Pumping fuel out of barrels until a complete fueling system can be installed.

There is one place where it's foolish to save money. That's on the improvements that go into the water. Pilings and bulkheads may be of concrete, steel or wood. Each has advantages and disadvantages that the experts can explain. But whichever you choose, make sure it is suited to long-term marine use and properly installed, or it won't last.

Is all the hard work and heavy investment worth it?

Vincent Bravo laments the fact that he's too busy these days to cruise as much as he'd like in his own boat. "But I like it," he says. "It's a fine business if you go at it cautiously, think hard and work hard."

"I wouldn't swap this life for anything," Frank Voight says enthusiastically.

New Popular Science book shows you

How to Make Your Own

Built-Ins and Space Savers

Here, at last, is the book that shows you how to expand your home by transforming unused space into compact, attractive living areas. Bill Baker, nationally known designer and furniture maker, brings you his original designs for 15 complete, space-saving projects. Step-by-step photos, hundreds of easy-to-follow instructions, exploded views and diagrams make every project easy to build.

Shows you how to cut costs with inexpensive plywoods, how to finish them with modern wood trims, laminates, plastics. You'll learn cabinet makers' secrets, acquire know-how about a wealth of techniques for indirect lighting, panelling, and much, much more!

Low-cost, Luxury Kitchen
Hideaway Bar
Home Theater Unit—TV, Hi-Fi, Radio
Woman's Dream Sewing Center
One-wall Complete Workshop
Ten Others
160 Pages
560 Step-by-Step Photos!

Order your copies of How to Make Your Own Built-ins and Space Savers NOW on the

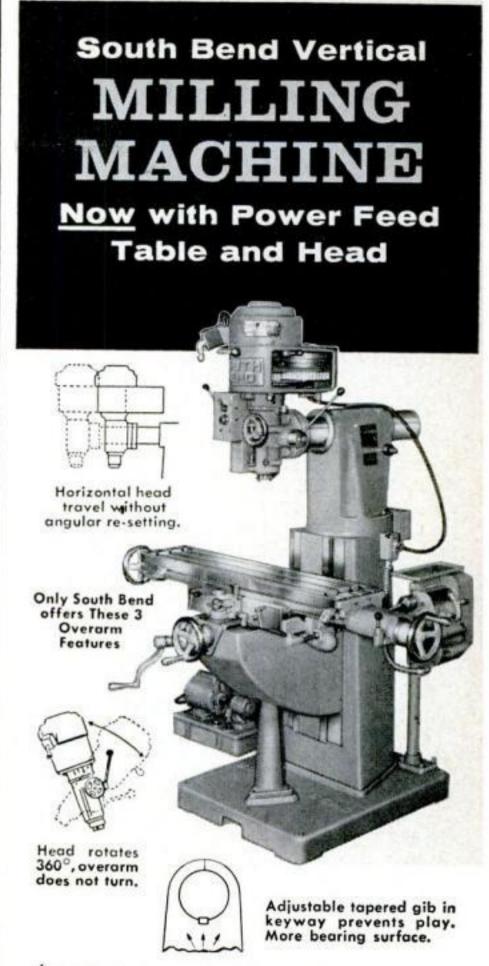


Popular Science Publishing Co.

355 Lexington Ave., New York 17, N.Y.

Rush me___copies of How to Make Your Own Builtins and Space Savers, at \$1.00 each. I enclose \$____. Books may be returned for prompt refund, if I'm not completely satisfied.

Name			
Address			
City	*Zone	_State	
·Avoid Post Office delay.			PS-759



- √ 30 feeds to table, ¼" to 15" per min.
- √ Infinitely variable feed to head, 0 to 25"
 per minute.
- √ Mills, bores, drills, reams at any angle.
- √ Easy accessibility simplifies job set-ups and tooling changes.
- √ 32" or 42" table with 20" or 30" travel.

Prices start at \$2429 f.o.b. factory.

SOUTH BEND



LATHE

SOUTH BEND 22, INDIANA

Builders of Lathes, Milling Machines, Shapers, Drill Presses and Pedestal Grinders.



Indispensable for home use...and never before priced so low! This compact, all steel, powerful SWINGLINE 101 staple gun is ideal for insulation, carpentry, upholstery, screening, wire fencing, plus thousands of other uses. Handle locks to fit pocket. Lightweight, maneuverable, jam-proof! Staple sizes 1/4", 1/6". Send for FREE book—"Tips for Tacking".

Swingline INC.

Dept. S-7-9 Long Island City 1, New York



CLOGGED SEWERS? CLEANED INSTANTLY SAVES PLUMBING BILLS —

CHICAGO -July 1st. Just introduced is a Free Bookleton a New Discovery which enables the Home Owner, Janitor, or Factory Maintenance to clean any Clogged Sewer Drain.

tenance to clean any Clogged Sewer Drain.
Yet anyone can operate this new Plumbers
Flushing Gun which releases air pressure on
a solid shaft of water cleaning the most stubborn stoppages up to 200 feet. TOILETS,
SINKS, URINALS, BATHTUBS, FLOOR
DRAINS, and HOUSE-TO-STREET SEWERS clogged with Grease, Rags, Sand, Roots,
and paper melt away instantly when struck
by the Hammer-like blow of this new unit.

by the Hammer-like blow of this new unit. There is no need to remove wall or pipe, or Grease Trap. A special attachment allows water to flow from the faucet through the Gun while air is released on the pipe. Vents or stacks are no obstacle, as force tends to strike wherever the water lays. But now, what is this Plumbers Flushing Gun worth in COSTLY PLUMBING BILLS SAVED? Tear this Ad out—and write your name and address beside it for FREE BOOKLET. Obey that urge. No agent will call. A post-card will do (Chicago Phone Kildare 5-1702) MILLER SEWER ROD CO., DEPT. PS-7, 4640 N. Central Ave., Chicago 30, Illinois.

NEW MAGIC RADIO WALKIE TALKIË!

WIRES OR HOOKUPS! Wt. only 5 oz. Size (1½x2½x4½x4½", Builtin telescoping antenna, Powerful Transistor-sensitive
microphone, frequency setter, break-in switch! Runs
for weeks on self-contained flashlight batteries, Durable plastic case. With this Radio Talkie you CAN
TALK TO YOUR FRIENDS NHARBY OR BETWEEN
TWO OR MORE CARS! INSTANT OPERATION!
No license needed! Uses inductive field magnetic
radiation, Useful and real fun in a million
ways! GUARANTEED TO WORK, 1 YEAR
SERVICE GUARANTEE.

SEND ONLY \$3.00. (cash, ck, mo) and pay postsend \$12.99 for prepaid delivery. COMPLETE READY TO OPERATE with instructions and hunreds of ways and tricks for brondeasts thru any radio desire. Price may go up soon, so get your NEW O-WALKIE TALKIE NOW, Available only from:

dreds of ways and tricks for broadcasts thru any radio you desire. Price may go up soon, so get your NEW POWERFUL RADIO-WALKIE TALKIE NOW, Available only from: WESTERN RADIO, Dept. RPS-7, KEARNEY, NEBR.

1960's Full-Size Cars

[Continued from page 78]

Larger Ramblers will flaunt lower, flatter front fenders and different grilles. Height reductions up to two inches have been reported. Roof panels will be flatter and windshields enlarged—may even be curved at top to blend into roof lines.

Several mechanical innovations are possible, but far from certain. AM engineers have been working closely with suppliers to develop a rear-mounted automatic transmission and are looking closely at aluminum engines. They would love to reduce weight—especially unsprung weight—to improve riding qualities and fuel economy. It's too soon to expect a

NEXT MONTH: Canny counsel for smart drivers from one of the world's top sports-car racers. John Fitch gives you his 14 commandments for safer driving on high-speed highways in "How to Drive and Stay Alive" in August PS.

radically new engine for Ramblers, however, although the company has gained valuable experience from its work on an aluminum V-4 for the military.

Except for lowered height, AM is sternly resisting any inclination to change overall dimensions. The 1960 Ramblers won't be any longer or wider, and will have the same wheelbases as now.

S-P won't rock the boat. Happy with the success of its Larks, Studebaker-Packard isn't planning drastic changes for 1960. New styling touches will be limited to minor exterior-panel alterations, a redesigned grille, and trim rearrangement. Dual headlamps may be added to some models.

Engine sizes and designs will remain the same, but minor modifications are being made to the six-cylinder power-plant to improve economy. Standard transmission linkage is being improved for easier shifting.

More models may be added to the Lark line, including a good-looking pickup truck and a sedan-delivery model.

So even without introduction of smaller Big Three cars, there should be something to tempt buyers when 1960 models hit the showrooms this fall—and no danger that customers will have to turn to used car lots to find full-size automobiles.

The Battery That's Used in Guided Missiles Now Released as Government Surplus



For Photography, Aircraft, Models, \$1.95 ea. Searchlights, Radios, etc. Postpaid

All cells guaranteed to your satisfaction or money refunded (less Postage).

ESSE RADIO COMPANY, Dept. 1 J 42 W. South Street

Indianapolis 25, Indiana



NORTH AMERICAN DIST!

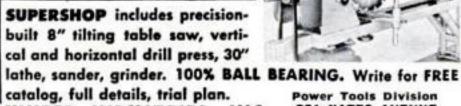
DETAILED PLANS PRICES GUARANTEE

NOW YOU CAN OWN BUILD and FLY ESSEX HELICOPTER

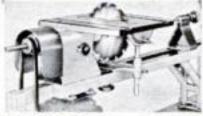
"Build-It Yourself", Very Low Cost Design, Glider or Motor Type 'copter—Simple To Construct, Easy To Fly. Can Also Be Mounted on Boat or Motorscooter. No Pilots License Necessary. Build and Fly in a Few Weeks! Order 1A Fuselage Plans, Specs., Kit Prices Today!

Ask About Our Heli-Boat Plans! ESSEX AIRCRAFT CO., LTD. P.O. BOX 151 WINDSOR, ONT., CANADA

RETAIL PRICE \$125.00 FACTORY TO YOU S



UNITED INDUSTRIES, INC.



Power Tools Division 221 YATES AVENUE BELOIT, WISCONSIN

When Writing to Advertisers Please Mention Popular Science



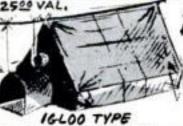


Has an extra lightweight tubulat steel frame. Was originally designed for British Army. Frame has canvas covered, fold-down pack shelf. Rack is designed so weight is carried at the hips. Folds flat for easy storage. Add 10% Federal tax to the price. Worth twice our price.

NEW 12 pc. CAMP KI

Complete set includes 12 gleaming aluminum utensils ALL designed to pack into the largest COFFEE POT kettle while the frying pan serves as a cover. Set contains: two kettles, frying pan, caffee pot, 4 plates and 4 cups plus handles for pots. Nested size 8"x 9", Ideal for Camp, 588 Boat, Cabin or Picnic use.





2-MAN ARMY NOUNTAIN TENTS

NYLON, Extra lightweight - ideal for back packing. Has sewed-in floor. Fully insect proof with mosquito net door closure. Size: 5 ft. x 7 ft. Holds two full size men

3% FT. × 5 FT. IMAN (2GAN USE) RUBBER BOATS =

top Gov't specifications. Reconditioned and ready to use. Ideal for lake, ocean or river.



21"x16"x12"

Made of extra heavy Neoprene rubber with an insulated inner lining. Will keep food or liquid cold all day. Perfect for icing down small game, fresh fish and meat of all types. 100% waterproof - salt and not resistant. In 2 sizes.



NEW ARMY MOSQUITO

Made of insectproof, heavy duty netting. Covers

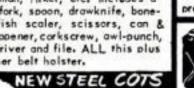
cot or sleeping bag for comfortable protection against flying insects. Comes with supporting poles. Regulation Army equipment.



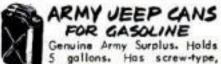
Eliminates 121TEMS from your pack. Ideal for Camper, Bay Scout, Hunter, Fisherman, Hiker, etc. Includes a knife, fork, spoon, drawknife, bone-saw, fish scaler, scissors, can & bottle opener, carkscrew, awl-punch, screwdriver and file. ALL this plus a leather belt holster.



Ideal for preliminary survey work. Reads approximate elevation or depth of any point on the horizon. Also gives the degree of incline or decline. Only 2-3/4" in diameter by 5/8" thick- easily fits in a pocket. Internal scale reads negative and positive level. When reading has been obtained, internal scale may be locked in position for reference. Depressing a button on top of case locks scale. When pressed again, scale is free to move.



Has tubular steel frame Steel springs. Size: 72" 30". \$30 value. Folding CANVAS COTS, New. SAVE The best, Wood frome. 788



self sealing cap.

NEWLY manufactured, percelain



FISHERMAN'S SURPRISE !! A Gov't Surplus Bargain. Packed in steel 30 caliber Ammo box with hinged cover, Includes 1500 ft. of No. 10 line. A box each of 100 hooks, No's 6, 9 and 3, Plus 2 streamer flies, shark hooks, sinkers, 388 Tarpon line, hook assemblies, etc. All for . . . 388

Swedish Army FOLDING BAYONET . . . \$2.98 - Paratrooper FOLDING MACHETE 2.89 Folding Machete HOLSTER for above. . . . \$1.50 C-22" Vanadium Steel MACHETE with case 1.98 D - British Army comb. PICK-HOE TOOL . . 1.49 E - Officer's Lensatic POCKET COMPASS. . 3.49 - New Navy FIGHTING KNIFE with sheath 2.98

2263 E. VERNON AVE., Dept. PS-79 LOS ANGELES 58. CALIF.

end Check or Money Order. 1/2 dep with C.O.D. All items are shipped postage or freight collect.

NEW 64 PG. CATALOG. Send 25¢ to mail & handle.

Those Amazing Epoxy Adhesives [Continued from page 170]

Recently developed packages now make it easier to mix just enough for the job at hand. Among the most convenient are the two toothpaste-type tubes, like those used by Hysol and Metalset. You simply squeeze equal lengths of paste on a scrap of glass or other disposable surface, and blend the different-colored materials until the mixture is free of streaks.

Secret of the superior performance of all epoxy adhesives is the chemical reaction that occurs when the hardener is mixed with the base resin. Unlike other adhesives, they contain nothing to evaporate or dry out. No air is needed for oxidation and no volatiles are given off during curing. In fact, epoxy adhesives will cure underwater, or sealed between two non-porous surfaces. They cure at room temperatures, but like other chemical reactions, this can be speeded up by heating. No clamping is needed. All that is required is to hold the mating surfaces in contact and undisturbed until the adhesive hardens.

Excellent flow during cure plus high cohesive strength contribute to good results, even in bonding two surfaces that may have voids between them. Shrinkage is practically nil, which is one reason for the epoxies' great success as crack fillers and sealers.

Success is not automatic. Some users of epoxies have been disappointed, although most are enthusiastic about doing hitherto-impossible jobs. I talked to a number of adhesive engineers, and here are some of the points they make:

 Some suppliers oversimplify their instructions and exaggerate the ease of accomplishing miracles.

 There are many possible formulations of epoxies, each with its own poculiar virtues. Often the directions don't make clear that a particular product may be an excellent crack filler, for example, but only a fair-to-poor bonding agent. Or vice versa.

 Only rarely is enough emphasis given proper joint preparation. Scratching the surfaces with a wire brush or sandpaper is seldom enough. Ground or filed metal surfaces should always be cleaned with a solvent, such as carbon For maximum bond, all surfaces must be completely free of grease. Even an oily fingerprint may be enough to weaken the joint.

 Bonds to some metals—such as nickel, some forms of brass, lead and zinc —are apt to be poor. After special chemsatisfactory ical surface preparation, bonds can be obtained with some of these.

 Epoxies lose strength at high temperatures. Safe temperatures vary, but great strength should not be expected at

over 300 degrees F.

 Sheer strength of the bond is exceptional, but peel strength is only moderate. For maximum structural strength, joints should be designed so the greatest stresses will be parallel to the glue line.

The uses are not limited to just patching and repairs. You can develop a whole bag of new tricks for your home-workshop projects. For example: Permanent threads in wood can be made with epoxy adhesive. Just drill a hole slightly larger than the bolt you want to use, coat the bolt threads with grease, put the bolt in the hole and fill the hole with one of the epoxy "putties." When it hardens, unscrew the bolt and you'll have the slickest threads you've ever seen. The same trick will work with metal, too, but don't forget the grease on the threads or you'll never get the bolt out.

Entire metal projects that formerly would have required a welding machine are possible. A word of caution here: Try your joint designs, adhesive, and techniques before you commit the materials for an entire project. I have put together joints I could break with my bare hands, and others that I have been unable to break with an automobile jack.

One essential for success: Provide plenty of bond area in the design of the joint. Use sheet-metal reinforcing strips across the joint, if necessary, to get a large bond area. Also allow ample time for curing. The glue may seem hard, but often the bond doesn't attain maximum strength for several days, especially if temperatures fall below 70.

The strong bond you can make between wood and metal offers limitless possibilities for simplifying, and strengthening, wood projects. Because no clamping is needed, metal reinforcing pieces can be held in awkward places with masking tape until the glue hardens.

This One



K2RA-74D-1NAD

Copyrighted material



How to tune up your car without tools

1 Use some clean rags and a bottle of non-flammable household cleaning fluid to remove every speck of dirt and grease from exposed ignition wiring, spark coil, condenser, distributor, battery top and spark plugs. This will cut down electrical "leakage" and give you a more potent spark for increased pep and gas mileage.

2 Clean out carbon and combustion deposits from engine's upper cylinder area with a series of full-throttle accelerations. Do it this way: Find a stretch of lightly traveled road and brake to a stop with your engine idling. Now put 'er in gear and accelerate to the legal speed limit as fast as you can — with the gas pedal pushed down to the floorboard. Gently brake to a stop and repeat six times.

3 Take a 100-mile round-trip drive on open roads where you can drive at legal speed without constant stop-and-go. This will "boil away" liquid contaminants that get into your motor oil between 1,000-mile changes — and improve your engine's lively "feel."

4 Make it a habit to use the *only* gasolines specially blended for *your* climate and altitude *wherever* you drive . . . Texaco Sky Chief Su-preme with Petrox, or regular-price Fire Chief. You get superior performance with these gasolines because their formulas are changed every month of the year in every one of 26 climate areas in the United States.

Yet, they cost no more than other "premium-grade" and "regular" gasolines!





New Du Pont Paint Retards Flame Spread

Here's a major paint improvement from Du Pont Research: Fire Retardant Paint! A durable, washable interior flat finish that slows the spread of flame. For years, firemen have pleaded, "Find a way to give us 5 minutes jump on most fires and we can control them."

This new Du Pont Fire Retardant Paint is the answer. It passes the rigorous tests of Underwriters' Laboratories. Use it on any interior surface, at home or business. It might well be that "ounce of prevention" that protects you from a disastrous fire loss. There's no other paint like it.

Looks, Wears, Applies, Dries Like Regular Flat Wall Paint

Du Pont Fire Retardant can be brushed, sprayed or rolled on . . . is available in the colors you want: blue, yellow, pink, green,

gray, ivory or white. Now ready for prompt delivery at your Du Pont Paint Dealer's. His name is listed in the Yellow Pages.

Buy the paint that's worth the work! Your time is too valuable to risk on "bargain" paints. Buy Du Pont Paint and you know you're getting the most modern finishes made...and that the beauty will last. Du Pont Paint Chemistry assures you of that.



Better Things for Better Living ... through Chemistry



Smart new Country Sedan, one of 6 new Ford wagons

For small budgets with big plans

A big Ford wagon, of course! Here are living room dimensions—living room comfort—from America's wagon specialists. Loadspace wide enough to bowl in...big enough to live in. Luxury Lounge interiors with sofa-soft seats, a picture-window outlook and all 9 folks facing forward.

There's also a new lease on life for your budget. Ford wagons use *regular* gas and go 4000 miles without an oil change. Best savings of all, Ford is the lowest priced

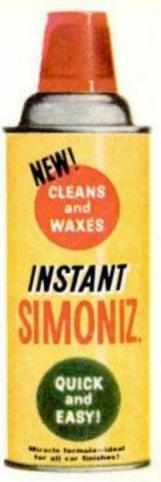
wagon of the most popular three. Why not "move in" to a 59 Ford wagon today!

Safety Glass all around • Extra-wide tailgate opens with one hand • Diamond Lustre finish never needs waxing • Color-keyed, easier-to-clean interiors



WORLD'S MOST BEAUTIFULLY PROPORTIONED CARS

MIRACLE FORMULA—IDEAL FOR ALL CAR FINISHES!



Genuine paste wax plus cleaner ... in a push button can!

Now you can clean and wax your car —quick and easy. Now you can enjoy all the beauty, all the lasting protection of a Simoniz Paste Wax job—without the hard work. Just spread Instant Simoniz, rub in well, let dry, and wipe to brilliant luster. Instant Simoniz! In a modern push button can. Try it.

*All car finishes—new acrylics, melamines, lacquers, and enamels—look better, last longer, shine brighter with Instant Simoniz care.

INSTANT SIMONIZ

Gives you a real Simoniz job without the hard work

cleans and waxes... quick and easy!